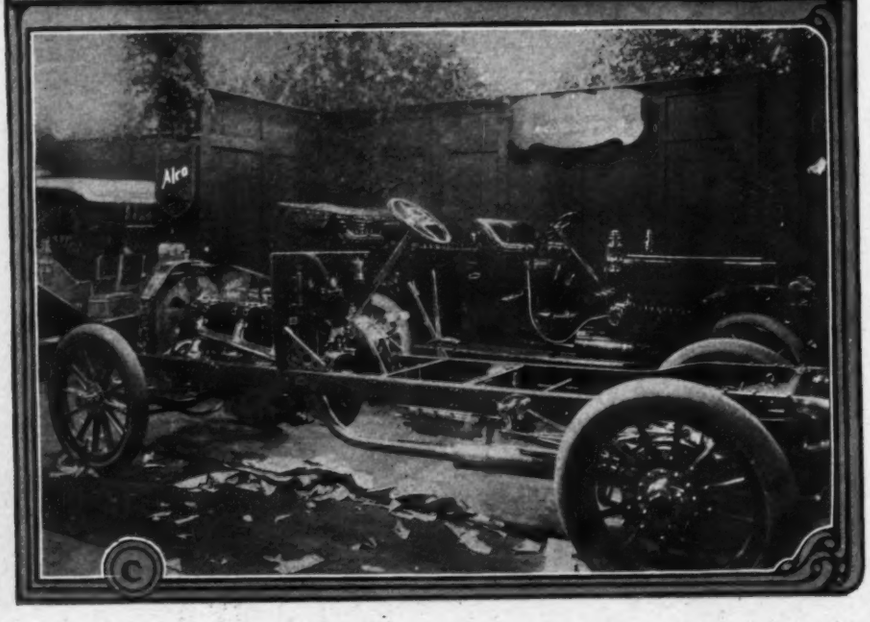
THE AUTOMOBILE

PUTTING an estimate on the attendance at the Coliseum during the opening time would be fully as inaccurate as many of the wild estimates which are now being made for the purpose of disclosing the extent of the automobile industry. The Coliseum, the Coliseum Annex and the First Regiment Armory were jammed to a state of suffocating congestion by an audience which by its dress and tone disclosed the presence of Chicago's four hundred, flanked by the Old Guard of autoists from all the automobile centers of America, with a fairly good presentation of the foreign contingent. The daily attendance after the opening has been fully up to the comfortable capacity of the entire space afforded, and that the audience has been entertained, as well as interested in the cars and accessories which were exhibited, was proven in a hundred ways.

Henry Thiede, the artist, whom Manager Miles placed in charge of the decorative scheme while he treated the Coliseum as the heart of the show and put forth his best effort there, he, nevertheless, made much of the Annex, the Armory and even the basement received a quota in the distribution of the decorative idea. In order to appreciate best the scheme of decoration it is necessary to visit the Coliseum, which, when properly described, would compare most favorably with any one of the many beautiful park scenes which abound in the metropolis of the West. The oak trees from Wilmette and the vicinity along the north shore were in a double line, towering above the exhibitions, reaching to the blue of the dome of the building, and the deception was carried to a fitting conclusion by the nature-faking way that stumps and roots, shrubs and moss were scattered about after a fashion, carelessly. Beneath all this haphaz-



A—Maxwell-Briscoe exhibition, presenting a bared chassis in the foreground, and types of touring cars in the background.

B—Metzger Motor Car Company exhibit, with a chassis in front and touring cars on the flank and rear.

C—Exhibit of the American Locomotive Company, presenting the Alco chassis in front and a touring car in the background.

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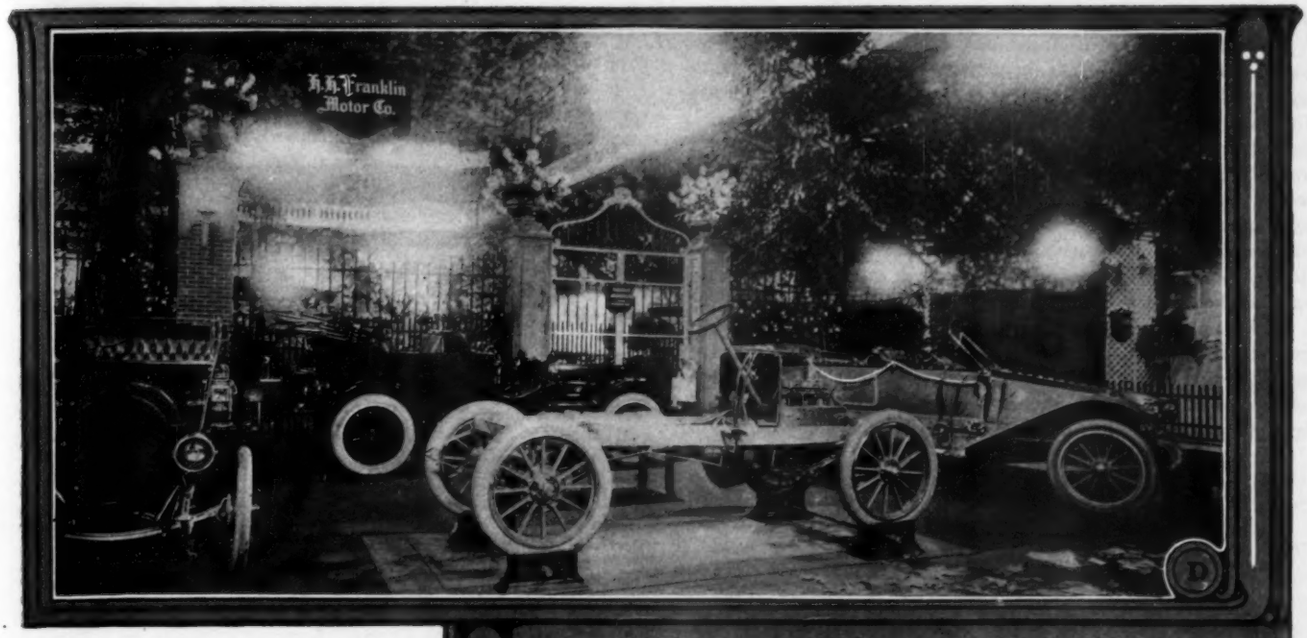
ard imitation of nature's handiwork, the trees, which were very large in some instances were anchored to the floor and structure most securely by proper bracing and irons, so that the safety of the public was cared for.

Expressions of satisfaction were in evidence at every hand, due to the excellent manner in which Manager Miles took care of the automobile contingent, somewhat, it is true, to the detriment of the accessory exhibitors, although there were so many applicants for space that it was simply beyond the range of possibility to care for the close approach to 200 of them who were left out. Under the circumstances it was a wise move to afford space to the car exhibitors and to improvise for accessory makers to the greatest possible extent. The 89,000 square feet of floor space available, having been used to the best advantage, was bound to terminate the effort of Manager Miles, and those who failed to draw the lucky number had but the one expedient to fall back upon, *i. e.*, an outside nearby exhibition.

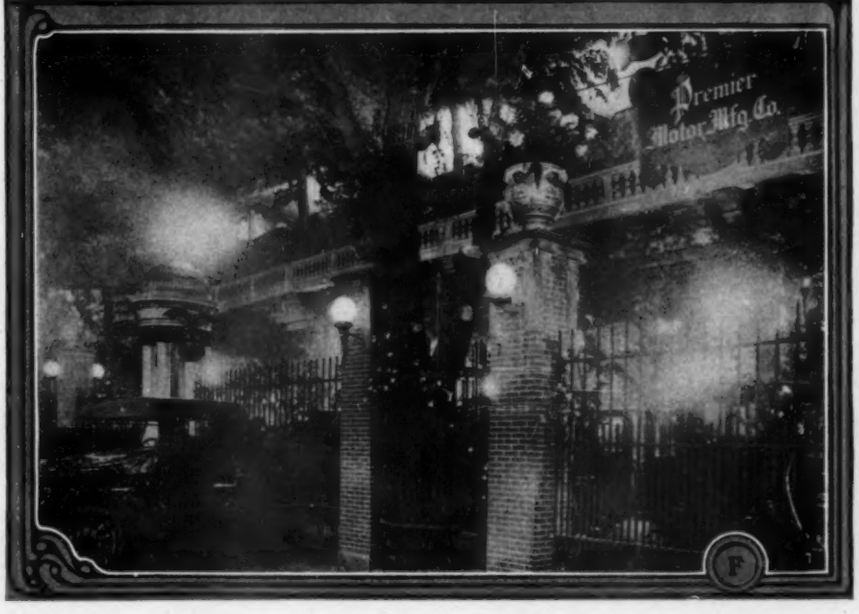
In a few instances car makers preferred to exhibit their wares outside of the big show, and notably the Ford Motor Company. Its policy is to exhibit at the New York Show only. The Ford branch in Chicago is turned into a showroom and, while it is in a relatively small way, it is putting up excellent op-



D—Franklin air-cooled exhibit, with a chassis on blocks in the foreground, the front of a touring car to the right, and another example in the background.

E—Buick exhibit, showing a bared chassis, and several examples of this make as a setting for the chassis.

F—Premier exhibit guarding the gate in a setting with a big tree to mark the place.



position to the Coliseum. Velie does not favor shows, and his company is keeping "open house" at the Chicago branch. Including the above-named companies there are 28 makes of automobiles which are being exhibited in branches outside of the show, 10 of which were not present at any of the big shows this year. They are: Davis, Cino, Enger, Westcott, Continental and Henry in the pleasure class; Schmidt and Duntley in the commercial line, with the Ohio and Ideal in the electrics.

Of the remaining cars which were unable to draw space, the following will be mentioned: Anhut, Panhard, Firestone Columbus, Simplex, Standard, Palmer-Singer, Isotta, Randolph, Saurer truck, Demot and Middleby. A number of the accessory makers also put up private exhibitions, among which is Michelin, with an elaborate window show; and in the new building of the Simons Hardware Company at the northwest corner of Michigan avenue and Fourteenth street, activity is rife, space having been leased to a half dozen concerns of prominence, including Anhut, DeTamble, Grout, Westcott, Continental, Paterson and Henry. At 1233 Michigan avenue Davis and Enger have taken space with Cornish and Friedburg, who handle the Schacht. In the Regal store at 1502 Michigan avenue the Duntley truck and the Cino pleasure car are shown.

CLOSELY examining the automobiles at the Ninth Annual National Show discloses many points which must impress the autoist of experience, some of which will surely appeal to designers as requiring slight attention in the long run, although the situation, from the user's point of view, is on such a high plane that criticism becomes extremely difficult, and for the most part unprofitable. This being the third large show within a few weeks, it has enabled spectators of acumen to reach conclusions of a more or less definite character bearing on the industry, with the idea of noting advances made, and the time is ripe to handle the subject on a basis of cold judgment, rather than to evade such of the facts as may be disconcerting.

With 81 makes of gasoline pleasure cars lined up for inspection, eight makes of electrics and nine separate makes of commercials on the flank of the pleasure automobiles, it is possible to go down the line and note just what the differences are. The first glance is enough to indicate to even a casual observer that there are many divergences. Some of the ideas are accounted for by circumstances, more by point of view, and, for the rest, they present evidences of differences of opinion of designers.

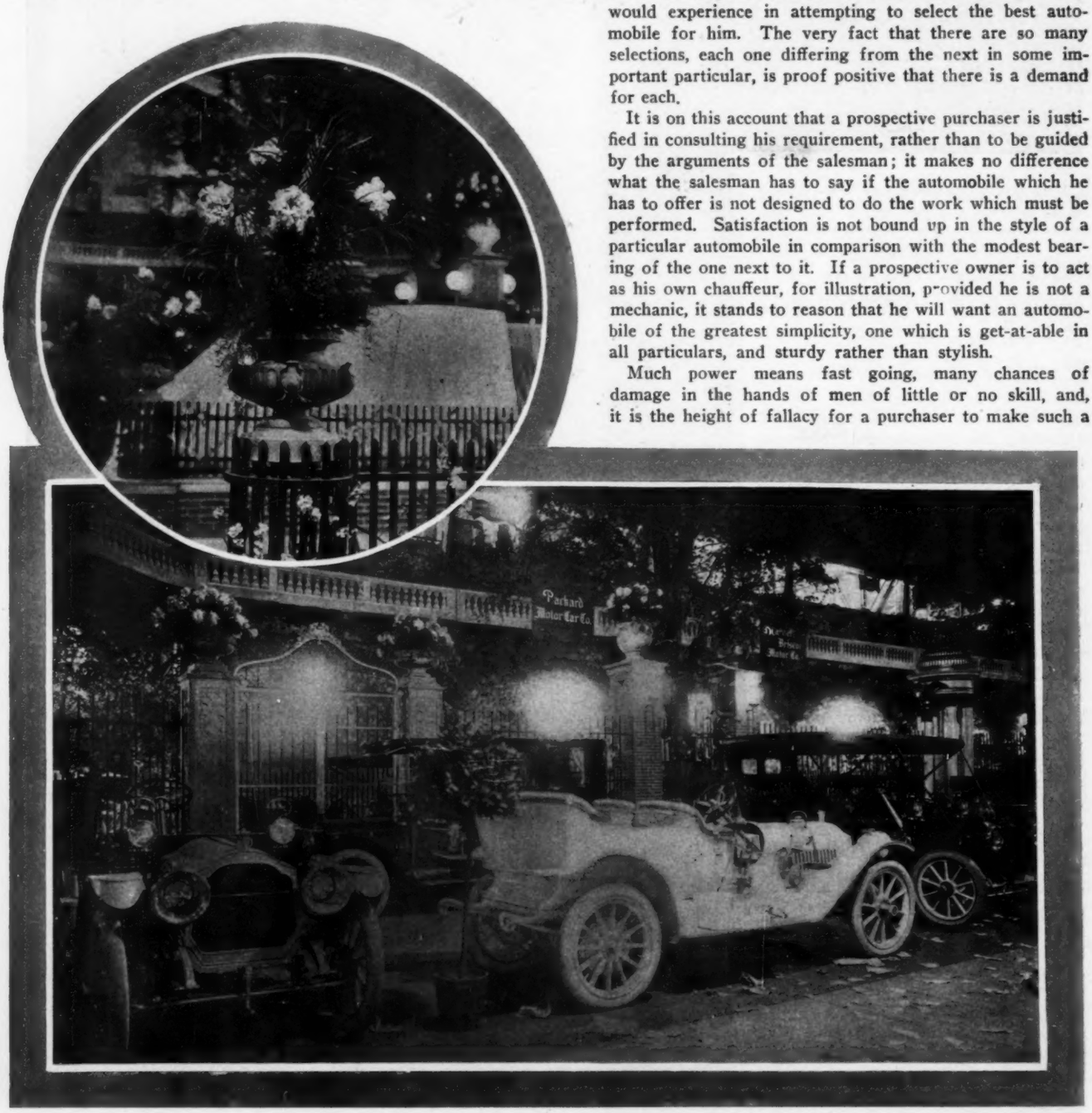
That there should be several schools of designers is to be accepted as a matter of fact, and in making comparisons it is necessary to differentiate as between the schools. Within a given school of design it does seem as if there should be a certain uniformity, and the few divergences from standard methods within schools are not so prominent as to defeat the main contention, i. e., the general situation is thoroughly healthy, and autoists, if they exercise a little care in making selections, should be rewarded by automobiles which will come up to all reasonable requirements in actual hard service.

SELECTION IS PUZZLING IN THE FACE OF NUMBERS

A count of the separate automobiles which are on exhibit discloses the presence of 266 different models, and this very fact adds to the difficulty which a man of even a fair amount of skill would experience in attempting to select the best automobile for him. The very fact that there are so many selections, each one differing from the next in some important particular, is proof positive that there is a demand for each.

It is on this account that a prospective purchaser is justified in consulting his requirement, rather than to be guided by the arguments of the salesman; it makes no difference what the salesman has to say if the automobile which he has to offer is not designed to do the work which must be performed. Satisfaction is not bound up in the style of a particular automobile in comparison with the modest bearing of the one next to it. If a prospective owner is to act as his own chauffeur, for illustration, provided he is not a mechanic, it stands to reason that he will want an automobile of the greatest simplicity, one which is get-at-able in all particulars, and sturdy rather than stylish.

Much power means fast going, many chances of damage in the hands of men of little or no skill, and, it is the height of fallacy for a purchaser to make such a



Presenting decorations, the iron fence and ornamental gate to the rear of the Packard exhibit, and Packard cars guarding the gate. The make is too well known for comment.

selection. A repair bill, when it is footed up at the end of the year, is bound to reflect the speed which the car may attain, on the ground that the energy which may be stored when a car is running on the road, is proportional to the weight on the one hand, and to the velocity squared on the other.

NEW MODELS STUDIED BY SPECTATORS WITH INTEREST

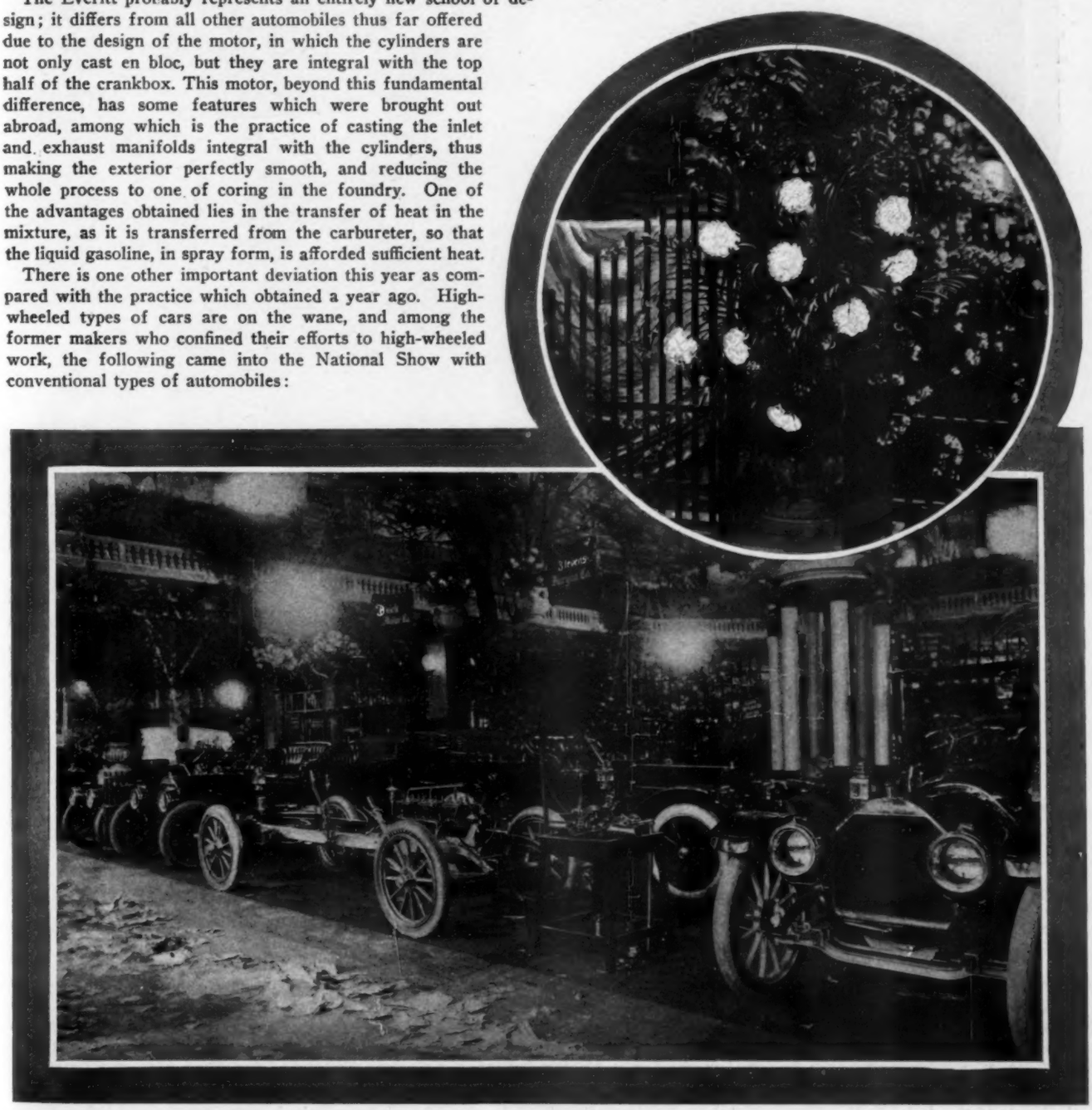
Before discussing the phases of the cars as shown, it will be profitable to understand that the new models (those which came out this year) would naturally have to be considered separately, if they represent radical differences in point of design from cars which were previously reduced to a settled plan. It is for this reason, perhaps, that spectators exhibit rare curiosity as they gather around the displays of the companies which have the most recent origin. The particular cars of the 266 shown which are less than a year old include Flanders, Hudson, Everitt, Ohio, Clark, Fuller, Cole, Lexington, Lion, Metz, Monitor and Springfield.

The Everitt probably represents an entirely new school of design; it differs from all other automobiles thus far offered due to the design of the motor, in which the cylinders are not only cast en bloc, but they are integral with the top half of the crankbox. This motor, beyond this fundamental difference, has some features which were brought out abroad, among which is the practice of casting the inlet and exhaust manifolds integral with the cylinders, thus making the exterior perfectly smooth, and reducing the whole process to one of coring in the foundry. One of the advantages obtained lies in the transfer of heat in the mixture, as it is transferred from the carbureter, so that the liquid gasoline, in spray form, is afforded sufficient heat.

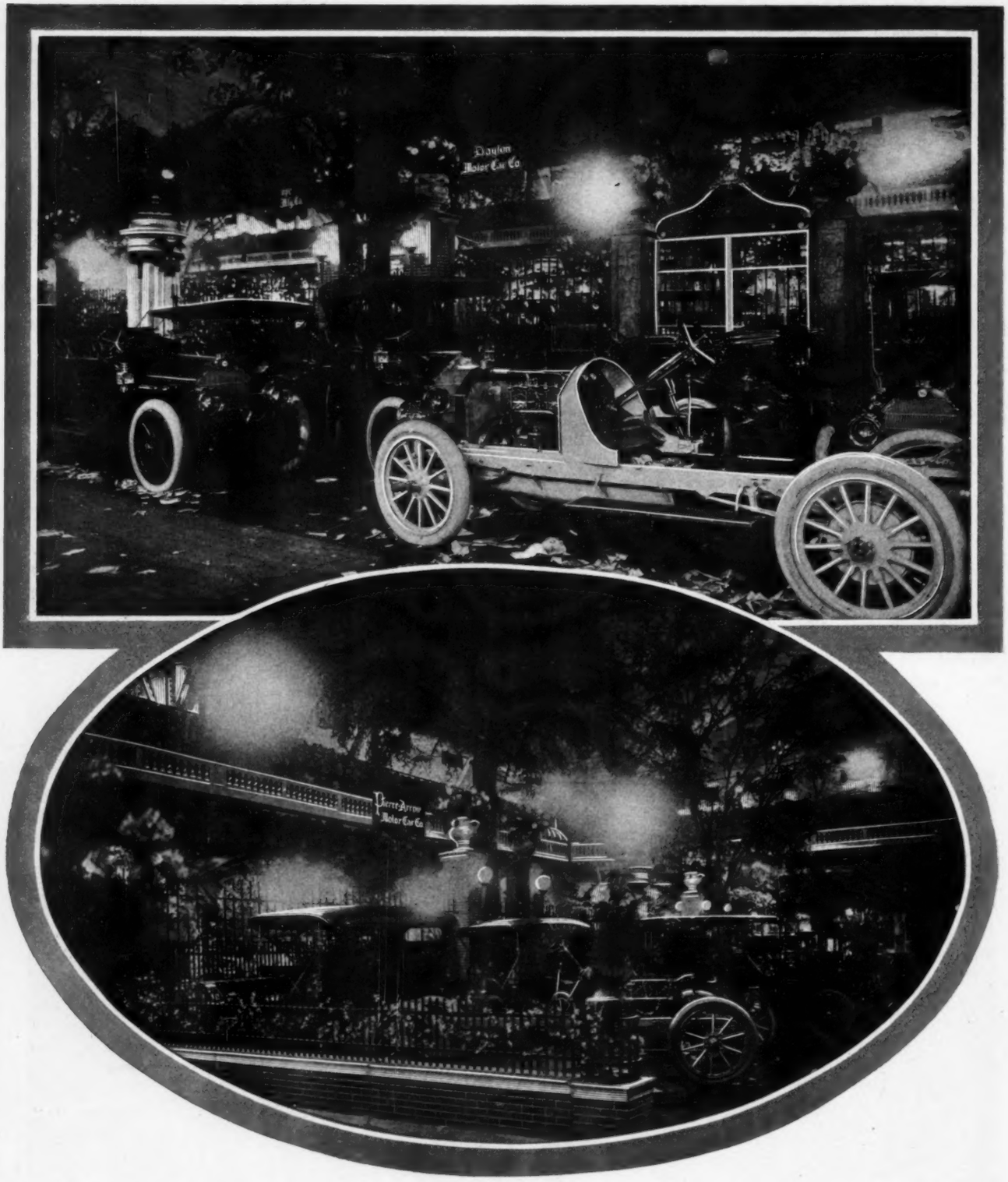
There is one other important deviation this year as compared with the practice which obtained a year ago. High-wheeled types of cars are on the wane, and among the former makers who confined their efforts to high-wheeled work, the following came into the National Show with conventional types of automobiles:

McIntyre, Staver, Black, Fuller, Schacht, Zimmerman, and Richmond. The failure of the Holsman Automobile Company, which went into the hands of a receiver after it applied for space in the National Show, will have a marked dampening effect on the high-wheeled situation, since this concern was the pioneer in high wheel work, and despite the large number of cars put out and their performance, the end does not seem to be promising.

Visitors to the Chicago Show will encounter a number of makes of cars which were not exhibited at either of the two big shows in New York, and they will add something of interest. Some of these cars are very well known to the automobile fraternity, and but few of them are so new as to be wholly unknown to the casual visitor. These cars include Rambler, R. A. C., Auburn, Austin, Berliet, Dorris, Richmond, Lexington, Great Western, Springfield, Rider-Lewis, Fuller, Monitor, Clark, Diamond T, and Zimmerman. In addition to the Berliet, Fiat and Renault were in the foreign contingent, which made up in quality what seemed to be lacking in quantity.



Presenting the exhibition of the Stevens-Duryea, showing a chassis in the foreground, details of the differential on a stand, and touring cars to the flank and rear.



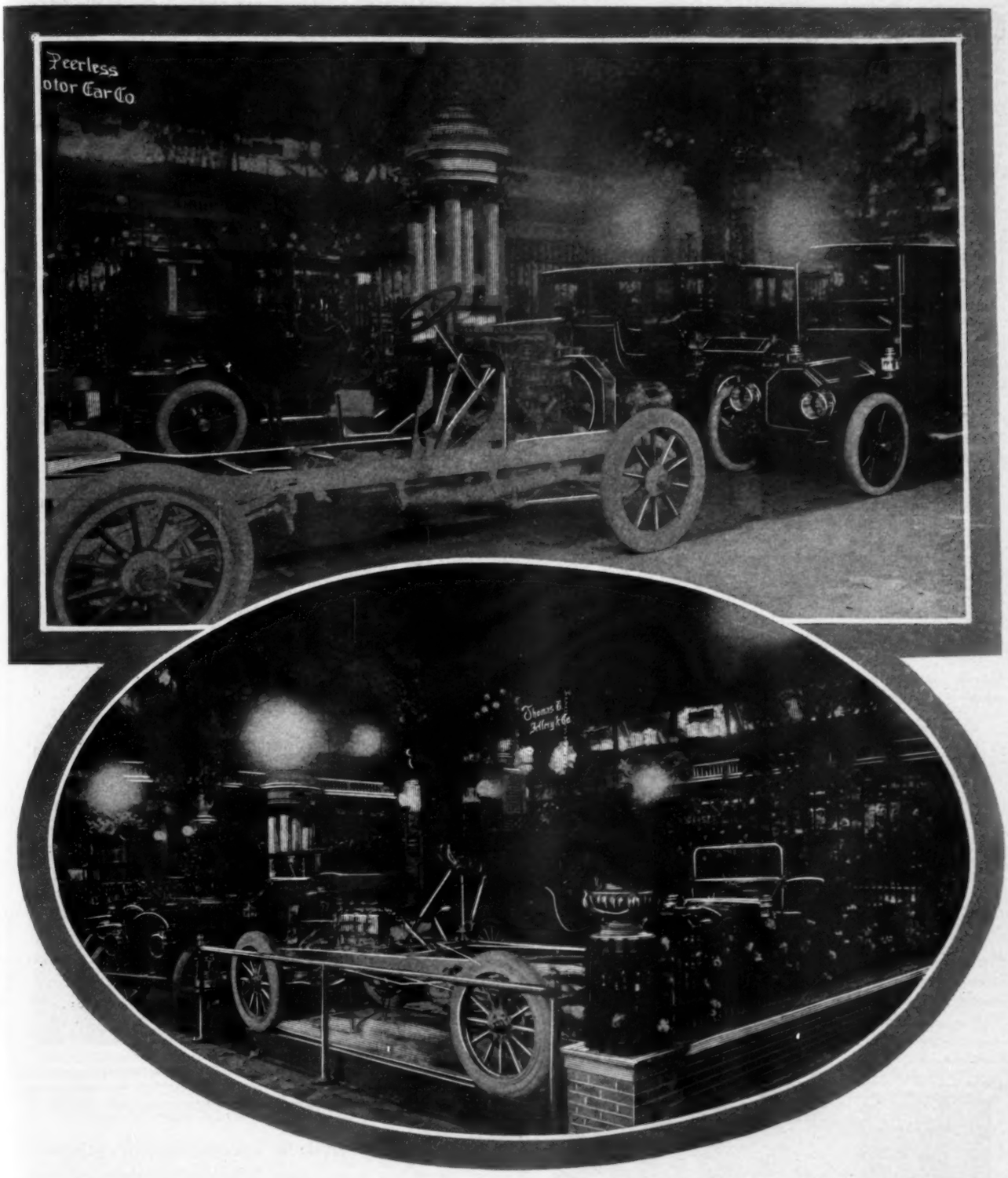
At the top, presenting the background for the exhibition of Stoddard-Dayton cars, showing a bare chassis in front, and several types of touring cars to the flank and rear.

At the bottom, presenting the Pierce-Arrow exhibition, which includes a "Six" chassis, touring car with cape top, and a limousine to the right.

INFLUENCE OF THE PATENT SITUATION ON THE FUTURE

Before this discussion, which has for its basis the types of automobiles as they are to-day, with a reflection of the future, it may be a point in favor of accuracy to take up the patent situation and discuss its merits. When Judge Hough rendered the decision to the effect that the Selden patent was valid, he put into the hands of the A. L. A. M. a lever which has already rendered it unnecessary for the A. M. C. M. A. to exist. This condition not only eliminates the A. M. C. M. A., which is about to be dissolved, but it bands together the great majority of makers of automobiles in this country, gives them the advantage of stability, in the absence of ruinous competition, and will have its bearing in the direction of standardization in the future.

In the past ideas, merely because they were different, were

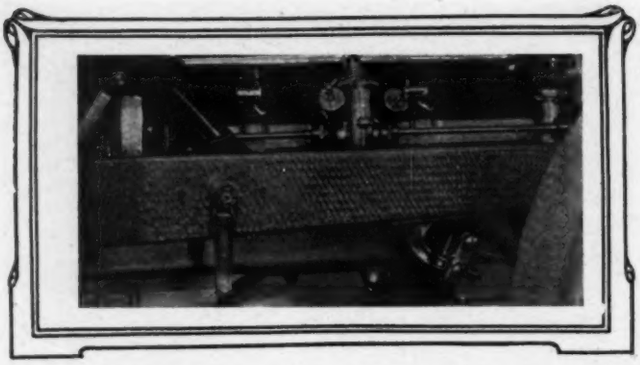


At the top, depicting the central figure of the scheme of decoration, and the Peerless exhibition in the foreground, numbering among its fine examples a bare chassis and types of enclosed cars.

At the bottom, exhibition of the Thomas B. Jeffery Company, presenting a Rambler chassis in the foreground, and other examples of Rambler cars surrounding.

looked upon as novel, and they were adopted by the respective companies in star-chamber session, and sprung upon an unsuspecting public at the shows. In many cases these ideas were half baked; in some instances they were tried out just enough to discover that they had the germ of practicability, without being sure that the factor called service efficiency resided within them sufficiently to take notice of.

While it is highly improbable that the automobiles which are now to be seen represent finality, the fact remains that they do represent a high degree of stability, are rational in their inception, and carry out the intent of the makers so thoroughly well that a user, if he selects the automobile in view of his real wants, will have no legitimate grounds for complaint. Satisfaction is now more of a certainty than an idle dream.



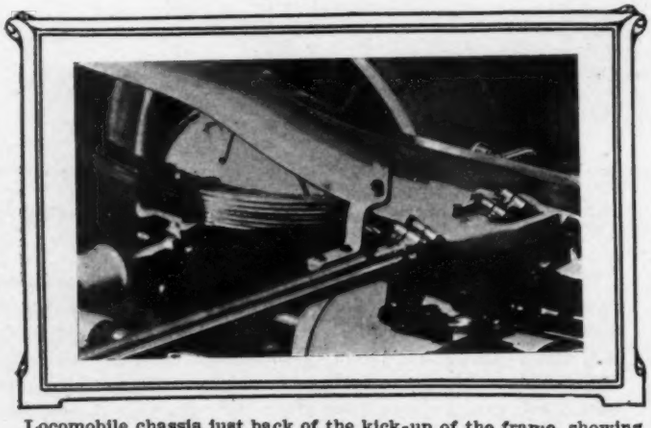
Oldsmobile, showing the steering arm and the spindle which projects through the chassis frame, also the front spring shackle.

BODY WORK SEEMS TO BE RAPIDLY CRYSTALLIZING

The influence of the carriage makers' art left its mark on the automobile, which has only been erased after several years of consistent advance, but last year, when straight-line effects were brought into prominence, it was then said that the body situation was adequately cared for. Torpedo types of bodies, which rather suddenly presented themselves almost at the show, before they were definitely known to obtain in this country, are not only promising, but they upset all earlier prediction. These bodies are more nearly in accord with the locomotive idea than anything which was heretofore presented, and that the automobile is properly classed as related to the locomotive rather than the horse, is a point which will scarcely require bolstering up. The word "locomotive" is used here in the sense that it distinguishes as between a self-propelled kinetic machine and a horse-drawn vehicle. The character of the stresses which are set up in the kinetic machine are entirely at variance with those which obtain when a vehicle is drawn.

WOODEN WHEELS ARE PREFERRED IN AMERICA

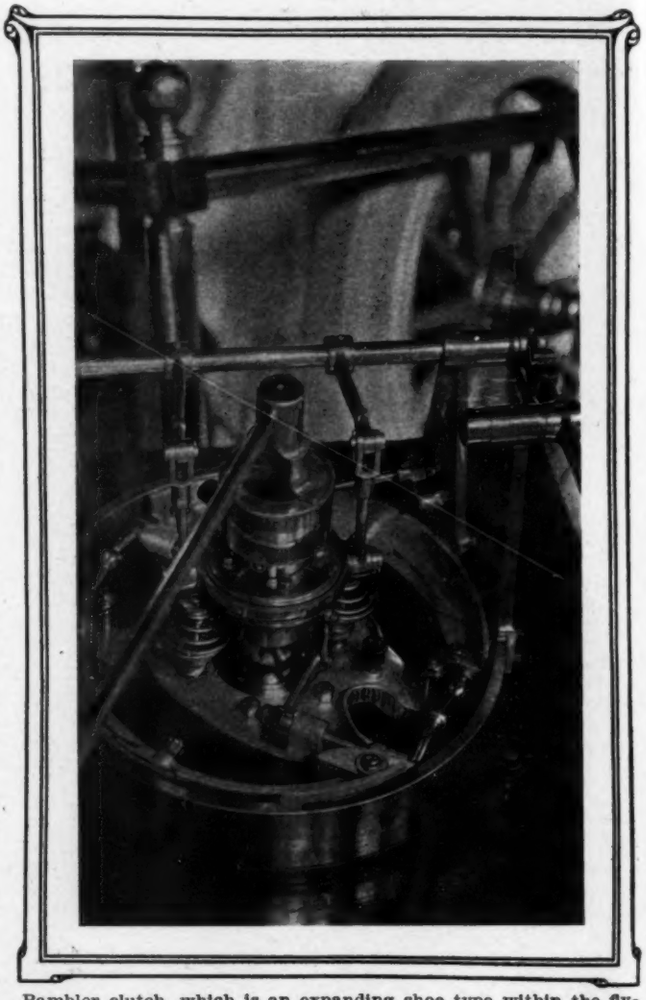
In England, where second-growth hickory or equally good wood for wheels is very much at a premium, wire wheels have reached the highest state of perfection, and are rapidly supplanting wood. This condition is not to be taken as evidence of superiority of wire wheels over wood; it has never been shown that wood, when it is properly selected, and the wheels are suitably made, offers any drawback at all. What the year does indicate, however, is that pneumatic tires were not large enough heretofore, and that in the long run the cost will be very much lower to the autoist if he pays more, provided he secures larger tires in the first place. Larger tires are in evidence in every make of automobile this year, but in purchasing a car it will be the height of wisdom to differentiate as between the cars which are obviously well equipped from the point of view of tires and those which may represent the contrary view.



Locomobile chassis just back of the kick-up of the frame, showing the brake equalizers, spring perch, and U-bolt fastening.

EFFICIENT AND DURABLE BRAKES ARE BEING USED

The most important difference which will be noted in the application this year over last will be found in the location, to a very considerable extent, of the service as well as the emergency brakes upon the traction wheels. There are two schools of design represented in this situation, in one of which it is truthfully claimed that the service brakes will be extremely effective if the drum is applied to the differential shaft, which operates at a higher angular velocity, and since the braking effort is transmitted through the side chain drive, or other mechanism, the inefficiency of this mechanical system helps to stop the car. The braking effort then is maximum for a given applied pressure on the periphery of the brake drum, but, as the other school of design points out, the transmission system must sustain under the work which is induced in the endeavor to stop the car.



Rambler clutch, which is an expanding shoe type within the flywheel, actuated by a double toggle motion.

SELECTIVE SYSTEMS OF TRANSMISSION GEARS DOMINATE

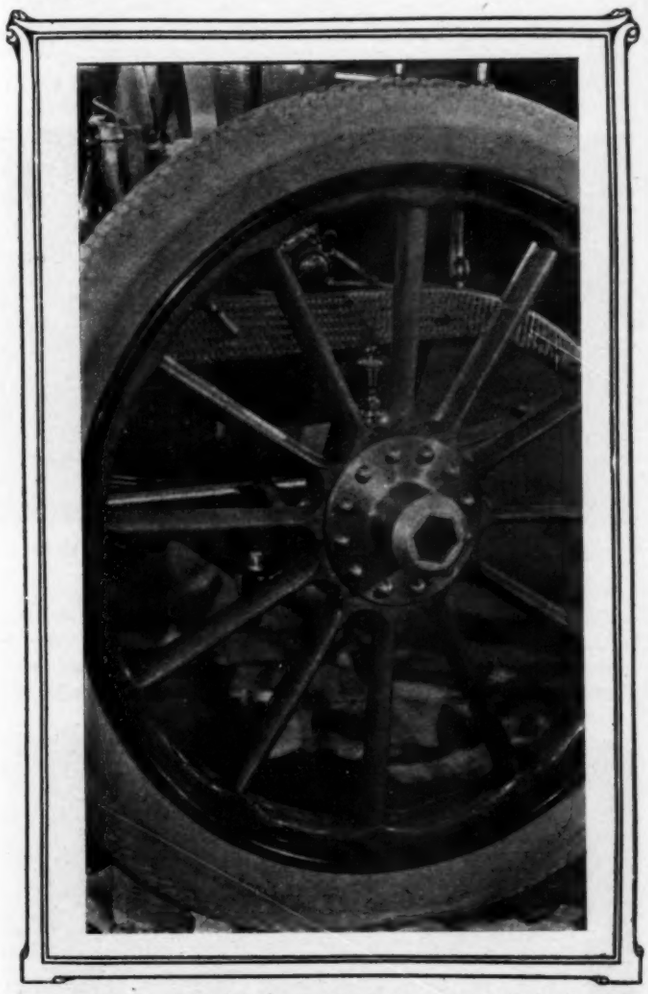
No attempt is ever made to deny the accelerating efficiency of a four-speed transmission system, but motors are now so relatively flexible that the three-speed sliding gear seems to serve every end, excepting, perhaps, in the very large examples of touring cars. That the four-speed system of transmission is limited to the relatively large and high-powered automobiles is proven by its presence in the limited number of cars as follows: Buick Model C, Chadwick "Six," Colburn Model M, Crawford Model G and F-G, Houpt, Keystone 6-60, Kissel Kar Model D-10 and G-10, Locomobile Models 1 and I, Lozier Models H and I, Matheson "Four," Oldsmobile, Palmer-Singer, Peerless Models 27, 28 and 29, Pierce-Arrow Models 36, 48 and 66, Premier 6-60, Rainier, Royal Tourist Model M, Schlosser 24, Simplex 50, Stearns

30-36 and 45-90, Studebaker Model G-7, Thomas Models J and K, White Models G-A and G-B, Winton Models 48 and 60.

Selective transmission gears are now so much used that the progressive systems are only discovered as the result of a diligent search. The best way, perhaps, to indicate the small extent to which progressive systems are employed is to enumerate the cars which have them: Great Smith Model 45, K-R-I-T (two speeds), Middleby, Mora 20, Stevens-Duryea, all models; Autocar, Buffalo (commercial), Gramm-Logan Models X, Y and V (commercial), and Packard (commercial).

ALMOST NO EVIDENCE OF STANDARDIZING PRESENTED

Autoists frequently complain of the varying methods employed in connection with selective sliding-gear systems. Considering three-speed selective systems, it is claimed by many autoists that

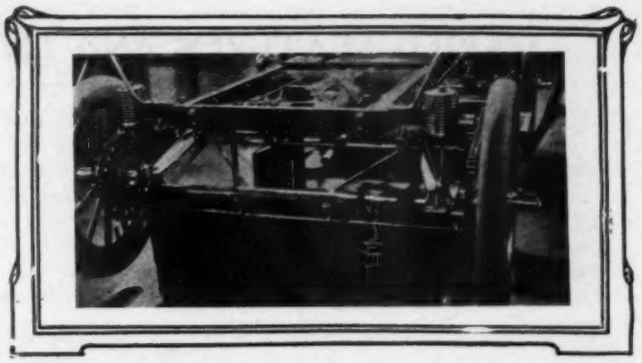


Front wheel of the Oldsmobile, showing hexagon hole in the hub and other nice features in design.

they should all be exactly alike, in order that an autoist could take hold of the lever in any car and without the slightest hesitation manipulate the same with absolute confidence, as a matter of habit, and the speed changes should then respond in precise accord with the dictates of his previous experience. Just when this condition will be brought about is difficult to state, but that matters of this sort will ultimately be reduced to a common standard has slight ground for prediction.

BEARINGS USED AND THE LUBRICATING PROBLEM

Plain bearings are now reduced to those which are employed on the crankshafts and connecting rods, insofar as work of great responsibility is concerned, and for the considerable number of bearings in and about the chassis for brake and control levers,



Rear of Brush Runabout, showing the side chain drive, substantial axle, wooden chassis frame and helical springs.

steering gear, spring eyes, and like parts. Beyond this point anti-friction types of bearings are looked upon as desirable, and they are almost exclusively used. When it comes to a classification of these anti-friction types of bearings, however, it seems futile to attempt the task on the ground that in many cars three or four different types of bearings are employed, and, for that matter, there are very few automobiles in which any one type of bearing is used to the exclusion of all others.

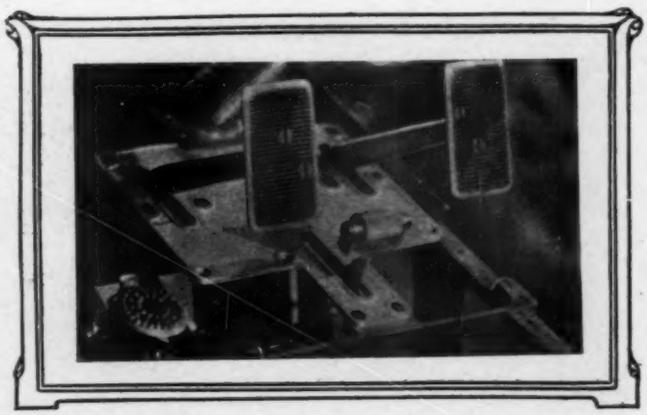
Water cooling obtains in all examples excepting the following: Adams-Farwell, Cameron Models 11, 15 and 16, Franklin Models D, G, H, K-4; Illinois, Kauffman, Kenmore, Metz, Middleby, Ranger Model D.

The block type of motor, which is the most recent idea in cylinder work, will be found on the Acme, Bergdoll "30," Billy Four, Continental "30," Courier, Eastern, Empire "20," Everitt "30," Flanders "20," Ford Model T, Hudson "20," K-R-I-T, Lambert Models 17, 28 and 36, Rider-Lewis, Stearns 15-30, Warren-Detroit, Welch Model R, White Models G-A and G-B, Hudson "20" and Chalmers "30."

POPPET TYPES OF VALVES ON THE WANE

The introduction of the Knight type of motor into the British Daimler in England, Mercedes in Germany, Minerva in Belgium, Panhard in France and Deluca Daimler in Italy, each one of which concerns having experimented for upwards of two years, now report very satisfactory results, and have adopted the Knight motor for the future. In this country four of the big makers have had cars on the road for several months.

Two-cycle work is advancing steadily; the improvements made within the last year were such as to lend encouragement, and the cars which include the two-cycle principle as they were exhibited at Chicago or elsewhere may be set down as follows: American Simplex, Atlas Models F, G and H, Bailey Olympic, Elmore Models 36 and 46 and Paige-Detroit.



Lozier footboard, presenting details of the pedals and method of fastening the steering column.

VARIED FEATURES AND ITEMS OBSERVED AT CHICAGO

CHICAGO, Feb. 5—One hundred and one exhibits of complete cars—that is Chicago's boast. It is the largest number on record for any show ever held in this country. In addition there are close to 200 exhibits of accessories, including 120 members of the Motor and Accessory Manufacturers, and a number of motorcycles. Motor buggies, strange to relate, have almost disappeared. Many new productions of the Middle West are shown for the first time, nearly all of them being of the conventional type, with four or six-cylinder motors, sliding gears

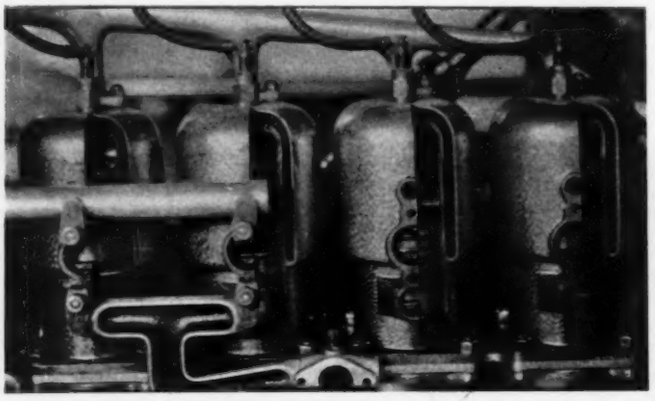


Fig. 1—Elmore four-cylinder, two-cycle motor of the valveless type, with cylinders cut away to show absence of complication.

and shaft drive. Most of them, too, give a remarkably large amount of "car" for the money, the average being 30 A. L. A. M. horsepower at a price of $1,600.

In its decorative effect the show is exceptionally fine. The Coliseum conveys almost perfectly the illusion of an English garden. Gigantic oaks tower into the blue sky above; beneath, the spaces are divided off by fences of brick and iron, covered with trailing rose vines. In the Annex the scenic effects were limited by a low ceiling, but an impression of spaciousness has been secured by cleaning out the backgrounds between the spaces, and the rose garden decorations give a good effect. The Armory, too, has been enlarged in appearance, and the decorations are attractive and in keeping with those of the other buildings.

As usual, the newspapers, in attempting to spread themselves on show news—for which no one will criticise them—have by the mistaken efforts of cub reporters added considerably to the gayety of the show. One scribe undertook to discuss the Thomas revolving chassis, the same which was shown at New York, on which electrically lighted signs appear to call attention to

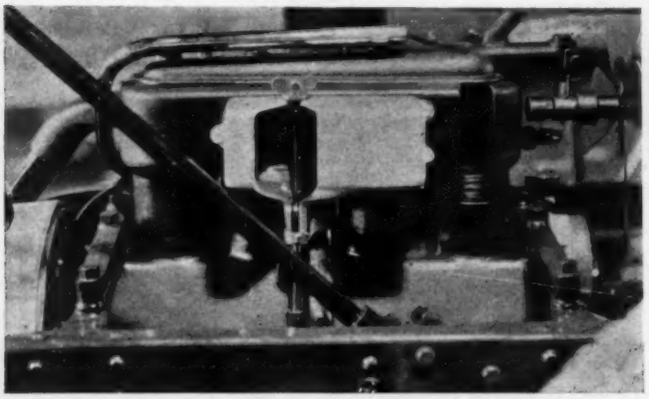


Fig. 2—Everitt motor, showing block cylinders integral with the top half of the crankcase.

various mechanical points. His account read as follows: "Tiny lights are distributed through the mechanism of the engine. A touch on a button lights these and the interior of the car then is ready for inspection. A rainy day or a cloudy one is all the same to the mechanicians whose car has broken down far from home. A touch of the button, the break is displayed by the electric light and hours are saved that otherwise would have been consumed in the effort to locate the trouble."

For almost the first time in history, the opening of the show was attended by good weather. Though the air was a little snappy, still the skies were clear, and the wind was only a zephyr, compared to the blasts of former years. However, Wabash avenue, the stamping ground of the demonstrators, is half blocked with piles of frozen snow from the recent storm.

The Thomas B. Jeffery Company has set into operation a novel

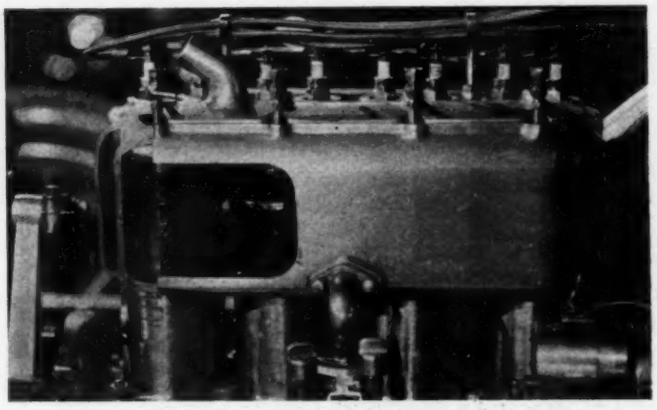


Fig. 3—Hudson Motor of the block construction, with the water jacket cut away and one cylinder sectioned.

idea, in running daily excursions from the show to the new Rambler plant at Kenosha, Wis., for the benefit of prospective buyers and agents. The daily attendance is very considerable.

Not all the exhibits were ready when the doors were thrown

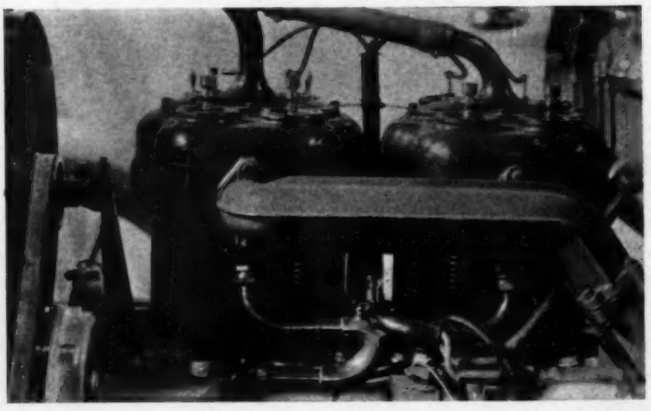


Fig. 4—Four-cylinder Nordyke & Marmon motor, showing large exhaust manifold and capable water connections.

open Saturday afternoon. Premier did not get its cars in till supper time, and on account of its prominent position at the intersection of the two main aisles this was particularly noticeable. Midland was another sufferer from the congestion of railway traffic. At the stand of the Everitt-Metzger-Flanders Company only one car was to be seen, an E-M-F "30." One of the new Flanders "20" runabouts is expected to arrive shortly to round out the exhibit. It is eagerly awaited by the enthusiasts.

So far as could be seen during the first night, there are only three racing cars in the show. The Alco that won the Vanderbilt Cup, and with it of course the cup itself, appear prominently on the stand of the American Locomotive Company. Thomas has the car that won the New York to Paris race, and Chalmers the "Bluebird" which carried off the Indiana trophy last Spring.

Among the trophies shown, besides the Vanderbilt Cup, are the New York to Paris one on the Thomas stand and the Santa Monica and Portola by the Apperson; Knox, Chadwick, Chalmers and Buick all have extensive collections.

Among the news items which are floating about the show, is one concerning the reorganization of the Grout Brothers Automobile Company into the Grout Automobile Company. The new officers are: Hon. J. W. Wheeler, president; Elisha S. Hall, treasurer; G. E. Dexter, secretary, and Walter J. Gould, sales manager.

One of the newcomers which could not secure space in the big show was Cino, made by Haberer & Company, of Cincinnati. It is shown instead at 1502 Michigan avenue. Four cylinders, 4 3-8 by 5 inches, supply the motive power; the cylinders are cast in pairs with valves in the heads. Constant oil level is maintained

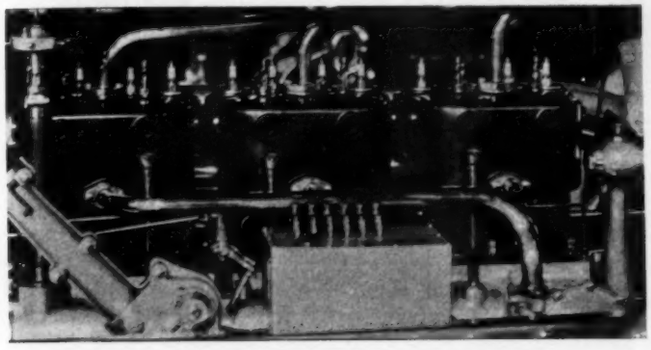


Fig. 5—Stevens-Duryea "Six," with cylinders in pairs, showing the four-feed oiler to the right and timer above cylinders.

by a pump, and a magneto is standard equipment. Multiple disc clutch, three-speed selective gears and a doubly jointed shaft carry the power to a Timken semi-floating rear axle.

Davis is another name hitherto unfamiliar among the ranks of the manufacturers. This standard touring car has four paired cylinders, 4 3-4 by 5 1-4 inches. The wheelbase is 120 inches, and the tires are 36 by 4 both front and rear. The springs are semi-elliptic in front and platform in rear. Multiple disc clutch

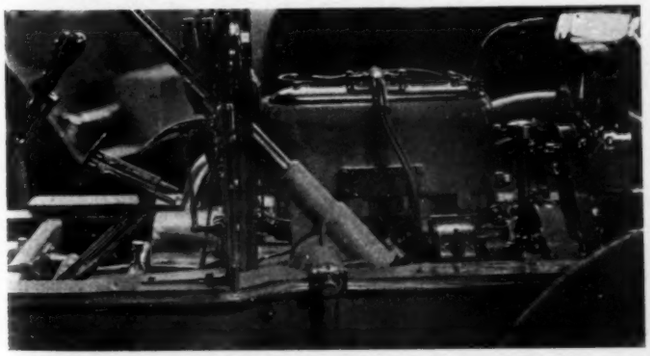


Fig. 6—White motor, showing block castings, long bearing for fan, steering post with shaft passing above chassis frame.

and three-speed selective gear set form the transmitting means; the rear axle is full floating, the shafts running on large imported bearings.

Evidences of quality are shown in the Westcott, among the little details being the milling of integral keys on the gear shaft for the sliding gears, instead of using a square shaft or inserted keys. The motor has 4 1-2-inch square cylinders, cast in pairs with all valves on one side. The multiple disc clutch forms a single unit with the change gear. The wheelbase is 112 inches and the tires 34 by 4.

In the low-price division, the limits of which are now considerably lower than ever before, is the Kenmore, on view at the corner of Michigan avenue and Fourteenth street. This has a two-cylinder horizontal opposed motor, air cooled, rated at 12-14-horsepower. The wheelbase is 82 inches, and either pneumatics or 32-inch solid tires are fitted.

The ranks of the commercial cars have been increased by the advent of the Duntley, made by the Chicago Penumatic Tool Company. This is a light delivery car with a two-cylinder horizontal opposed motor under the driver's seat. The cylinders

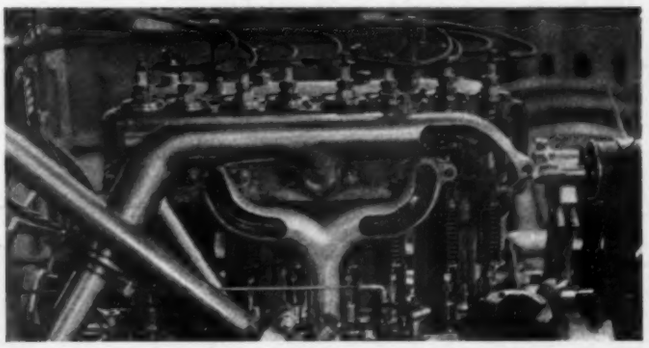


Fig. 7—Hudson block motor sectioned, and manifolds also sectioned to show uniform thickness of walls.

are 5 inches in bore and 4 inches stroke. Cooling is by thermo-siphon, ignition by double-unit coil and dry cells, and lubrication by a four-feed mechanical oiler. The gear change is planetary, and drive by side chains in the approved commercial fashion. The wheelbase is 86 inches, and the wheels 36 inches in diameter, shod with 2-inch solid tires.

A foreigner which is almost unknown in this country, outside of Chicago, is the Berliet, imported by Walden W. Shaw. The Berliet design, it will be remembered, was the original of the Alco, although the American car has long since departed from the designs of its French parent, and now it would be a clever man who could trace a resemblance. The Berliet cars range from a 12-horsepower up to a 60-horsepower limousine, and are a fine example of the best French construction.

Torpedo bodies are still quite a novelty in Chicago, and as a result those shown by Knox, Marmon and Winton come in for a good deal of attention. The Knox car with this equipment is a six-cylinder, with a very long, rakish look, due partly no doubt to its wheelbase of 134 inches.

Motorcycles as usual are in considerable prominence, having pre-empted the whole of the second floor of the Coliseum Annex. They do not seem to be quite as strong in numbers as last year, the roll call revealing but twelve makers. Still, they make a gallant showing, and are visited, despite their rather isolated position, by many people to whom their handiness appeals. Many professional men find advantages in their use.

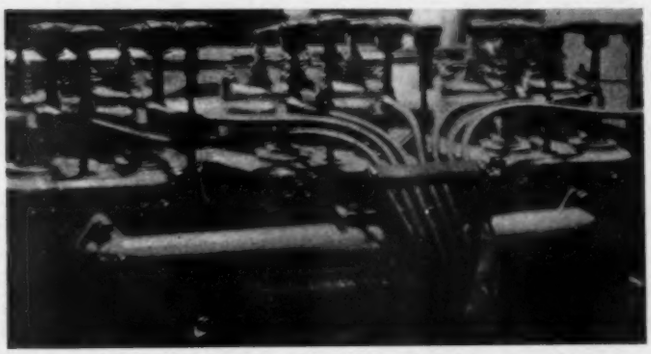


Fig. 8—Mitchell "Six" with cylinders in pairs, exhaust valves in the head, and details of the valve motion.

LATEST NEWS FROM THE CENTERS OF AUTOMOBILE ACTIVITY

FOUR NEW COMPANIES ADDED TO SELDEN PATENT LIST

A. A. A. SOLVES PROBLEMS AT MEETING IN CHICAGO

CHICAGO, Feb. 9—The first session of the Chicago meeting of the A. A. A. was held on Tuesday at the Armory, President Speare in the chair. Those who responded to the call of the roll included Ralph W. Smith, president Colorado State Automobile Association; M. C. Moore, president, and James J. Drought, secretary, Wisconsin State Automobile Association; E. J. Brochannon, of the Kentucky State Automobile Association; Chas. P. Root, president Illinois State Association; John Wilson, of the Pennsylvania Motor Federation; S. M. Butler, of New York, chairman of the Contest Committee; A. G. Batchelder, from New Jersey, chairman Executive Committee; S. A. Miles, general manager N. A. A. M.; Alfred Reeves, general manager A. L. A. M.

The Federal Registration bill came up for discussion, and the consensus of opinion as based upon this discussion was that the bill has an excellent chance of passing during the present session of the Congress, but it was concluded that the chances of success will be much enhanced if the various State automobile associations and the 240 clubs scattered throughout the country will exert a timely effort in the interest of this much-desired legislation.

The best time to select for the presentation of petitions with a view to favorably impressing the Congress will be at the time of the National Legislative Convention of the A. A. A., which will be convened in the City of Washington on February 15 and adjourned February 17. Secretary Elliott's report of the support which this convention is receiving included 33 State associations, and it is contemplated that the National Organization will soon be increased by additions from Florida, Oregon, Tennessee and North Carolina.

Chairman Butler, of the Rules Committee, in his report for 1910 covered the situation most thoroughly, resting it in front of the Board of Directors. Chairman Speare in his address, which was graceful, terse, and comprehensive, stated, among other pertinent matters, that the automobile center is moving westward, and its influence on the good roads situation is being felt, due to the pressure which farmers exert, now that they ride in automobiles. It is the belief of President Speare, that the final solution of the good roads problem lies in the widely disseminated use of automobiles.

During the meeting of the Executive Committee of the A. A. A., which was held in the afternoon at the Armory, this being the regular quarterly session, President Speare made a lengthy address, reviewed the activities of the Association adequately, and among the timely matters acted upon was the passing of a resolution expressing sincere regret over the death of John Farson, who, at the time of his death, was a member of the Chicago Automobile Club, and who will be remembered for his indefatigable activity and wise rules during his occupancy of the presidency of the A. A. A.

Secretary Elliott, in rendering his report, showed that there are 33 States represented in the A. A. A. The revised rules of the Contest Committee, after presentation, were referred to a sub-committee of the Board, which is empowered to act.

After voting to award tokens of esteem and appreciation to H. O. Smith, chairman, Alfred Reeves, the former general manager, and Job E. Hedges, the counsel, arranged for the distribution of a surplus which is in excess of $60,000, which the American Motor Cars Manufacturers Association kept as a balance, the meeting was held at the Southern Hotel yesterday in compliance with the terms of the five-year contract constituting the agreement under which the A. M. C. M. A. was originally banded. The Association was formed in Chicago in 1905, and its unusually successful career could scarcely be terminated without some mention being made of the shows which represented its important annual events. Its membership included 43 companies, all of which were represented yesterday at the gathering. There were speeches of congratulation on the work which was accomplished by the organization, and Chairman Smith was presented with a gold watch, which happy act was duly supplemented by votes for tokens to be presented to General Manager Reeves and Job E. Hedges.

The final resolution which was passed had for its purport the closing of the affairs of the A. M. C. M. A., and it was resolved that the A. M. C. M. A. expressed its high appreciation of the management of the Chicago Automobile Show for 1910, for the completeness of the arrangements and the purity of the artistic display, which was rendered none the less apparent by the interlacing of practical features which had a wide influence for success.

ORGANIZATION OF LICENSED DEALERS

NEW YORK, Feb. 10—At a meeting which is being held to-day, the selling agencies in New York, which confine their operations to licensed automobiles, is busy through its select committee in discussing the details of the organization, formulating by-laws and setting down the preliminaries of the policy which will be pursued by the licensed agents from this time on.

In the meantime, the Selden list has been augmented by the addition of the makers of the Grabowsky, Oakland, Randolph and Reliance, bringing the grand total up to 72 separate makers of automobiles, two of which are foreign makes, namely: Delaunay-Belleville and Lancia. It was stated last week that the licensed association dealers were backed up by the makers of cars under the Selden license, and this prediction seems to have come true. The licensed association is showing evidence of activity in the direction of indicating to purchasers of automobiles that they may expect "squalls" if, in selecting automobiles, they overlook the fact that patent 549,160 has been decided by Judge Hough to cover the basic principle of the automobile.

OVERLAND COMPANY GIVES BANQUET

The Overland Company gave a banquet to its dealers at the LaSalle Hotel on Monday night, which was attended by more than 200 agents from all parts of the country. One of the trophy displays along the row is the showing of the Wheeler & Schebler trophy which is on view in the windows of the Ralph Temple Automobile Company, which handles the Jackson and Fuller. This has occasioned some comment among those who remember the legal war which was threatened following the decision.

GLOOM CAST OVER SHOW CIRCLES

The sad demise of the mother of Manager Miles, which took place in Bristol, England, as the result of shock following a minor operation, was discovered following a cable from England to that effect, and when the executive departments learned of the unfortunate situation they were much affected. The news was not given out, but in some way it became known, and it cast a mantle of gloom over the further activities of his collaborators.

FORD MOTOR COMPANY ACQUIRES PRESSED STEEL PLANT

TO BE INDEPENDENT OF ALL OUTSIDE INFLUENCES

IN CASE OF A GENERAL MIX-UP FORD WILL BE READY

DETROIT, Feb. 9—When the A. M. C. M. A. is disbanded, as it certainly will be within the next few days, the Ford Motor Company will be alone in its fight against the owners of the Selden patent, and according to the Ford attitude, there is little to be feared from Selden interests by way of a direct Court attack. The Ford idea is to look out for flank movements. If the Selden interests should cut off his source of supply, Ford would have to come to terms, and in order that this condition may not be brought about, the Ford Company is closing in on its source of supplies. That is to say, Ford is making complete and thorough provision for all contingencies.

The John R. Keim mill, which is located at Buffalo, and employs about 600 men, has fallen into the control of the Ford Company by the purchase of the Spaulding interest (for Ford account) in this plant. The Keim plant is especially well fitted out to make such pressed steel products as are necessary in the production of Ford cars. It will be remembered that the Ford design is one which utilizes pressed steel to a marked extent, and the acquisition of this well-equipped plant by the Ford Company represents a move of the greatest importance. The John R. Keim mills is incorporated and has a capital stock of $350,000.

OFFICIAL AUTOMOBILE BLUE BOOK WORK

CHICAGO, Feb. 10—The Automobile Blue Book Publishing Company, who are hard at work on their 1910 editions, report very satisfactory progress in all branches of their work. During the driving season of 1909 they had three, and frequently four, crews of two men each covering the roads embraced in the several sections they publish.

Messrs. Robert Bruce and John F. Mixer traveling in New Jersey, New York, Pennsylvania, Delaware, Maryland, the District of Columbia and Canada, revised several thousand miles of old routes and added approximately 10,000 miles of new route matter—Canada, west of Montreal having about 2,500 miles.

Messrs. E. R. Mixer and Henry MacNair devoted their time and energies to the New England States and Canada east of Montreal, revising many of the old and connecting them with new routes and compiling text for about 11,000 miles never before routed. Covering Maine as thoroughly as Massachusetts, something heretofore not done.

Messrs. John P. Dods and Fred E. Lee have spent their time in the Western territory adding many connecting routes in Ohio, Indiana, Michigan, Illinois, Wisconsin and Iowa, and have invaded Minnesota, Nebraska, Kansas, Missouri and Kentucky. They have run three routes to St. Paul and Minneapolis from Illinois and Iowa points, two trunk lines across Iowa with many connecting links. A new route from Sioux City, via Omaha, Lincoln and Kansas points, to Kansas City, and a route from the latter city to St. Louis—a route never before published—securing about 10,000 miles of additional mileage.

Messrs. N. H. Van Sicklen, Sr., president of the company, and E. R. Mixer made the New York-Atlanta-Savanah and return trip, which will, with other matter since secured, give a direct route from all northeastern points to the South as far as Jacksonville, Fla., adding over 3,000 miles of new matter in a territory heretofore practically unknown to tourists.

A new style text, more easily followed, has been adopted, new and more explicit maps are being prepared and an entirely new system of indexing will be used, rendering the information contained in the various routes more easily located.

All sections will be ready for delivery April 15, and will undoubtedly surpass anything heretofore attempted in automobile road book and route work.

FEBRUARY MEETING A. S. M. E.

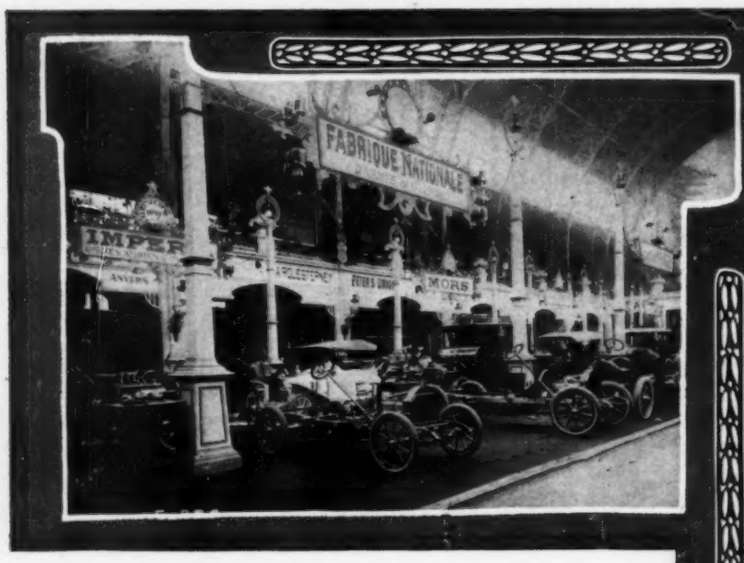
The American Society of Mechanical Engineers will hold its monthly meeting on February 8, in the Engineering Societies' Building, West Thirty-ninth street, New York City. This meeting will be devoted to the dedication of the memorial tablet to Dr. Robert H. Thurston, first president of the body.

CHICAGO AUTO TRADE ASS'N BANQUET

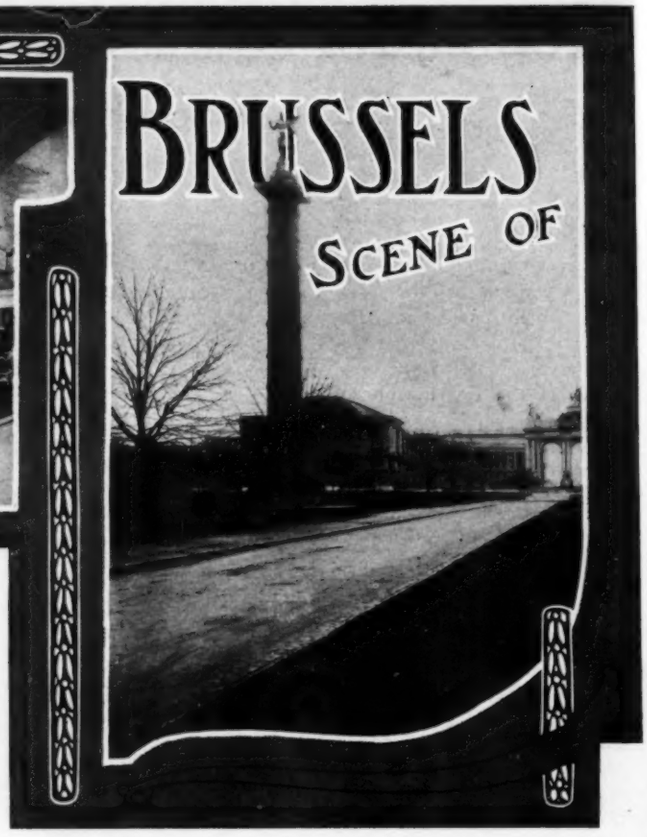
CHICAGO, Feb. 5—The fourth annual banquet of the Chicago Automobile Trade Association was held last night at the Chicago Athletic Association, there being 150 of the local dealers and their friends in attendance at the dinner, Thomas J. Hay, president of the association, acting as toastmaster. It was the most successful affair ever promoted by the dealers, and the speechmaking was most interesting. Prominent in the talkfest was Father M. J. Dorney, a priest from back of the yards, who delivered a running fire of witticisms on motoring in general, declaring that although he used to be an ardent admirer of horses, he had been converted, and that now he would not give up his motor car for a seat in kingdom come. Walter J. Moody, manager of the Chicago Association of Commerce, spoke on co-operation, and told of the mighty deeds that were possible if the dealers would only work as a unit in striving to promote the interest of the association. Howard W. Hayes, assistant corporation counsel, was much wrought up over the fact that the Illinois state motor law took away from the city the right to set a speed limit, but is somewhat reconciled because of the passage of an ordinance which makes it compulsory the examination of chauffeurs on public-hire vehicles. Mr. Hayes hung out a ray of hope to Chicago motorists who have been fighting against the wheel tax, declaring that the license committee of the city council was even now considering a reduction of the tax with a view to taxing by horsepower rather than seating capacity. Ira M. Cobe, president of the Chicago Automobile Club, intimated that the Cobe cup race this year will be run on a speedway, which is to be built within 40 minutes of Chicago. At the same time he gave an inside light on the loss sustained on the Crown Point carnival last summer, declaring that the club went $1,500 into the hole, largely because of the construction of fifty-four private grandstands around the course, thus depriving the club of revenue which was its due. Samuel A. Miles made a clever speech on shows, while David Beecroft, president of the Chicago Motor Club, wound up with a dissertation on the American Automobile Association, in which he urged the Illinois motorists to rouse themselves from their lethargy and assist the national body in the control of motoring sport.

LICENSED RANKS BULGING WITH MEMBERS

The latest announcement of the A.L.A.M. is to the effect that the membership is now 72, which includes two foreign makes of automobiles, i. e., Delaunay-Belleville and Lancia. The dealers who handle licensed automobiles are making a campaign in the interest of licensed interests, and, from all accounts, they are in close touch with the situation from the licensed point of view.



Small Cars Prominent on the Stand of the Belgian F. N.



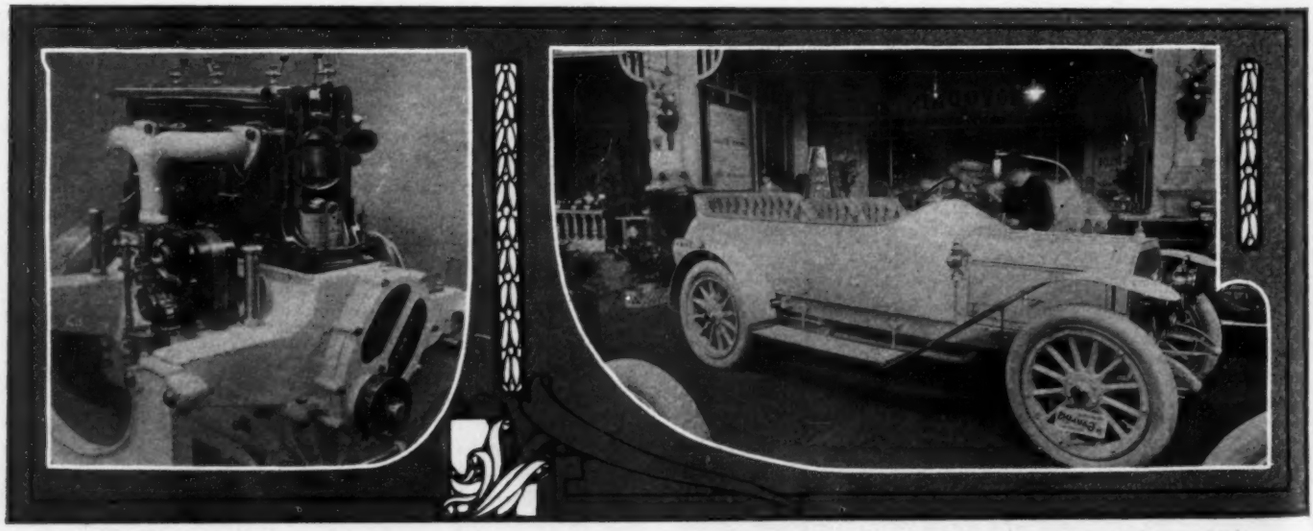
BRUSSELS, Jan. 30—Automobile expositions are rare in Continental Europe, and the one which closed this week in the Belgian capital therefore had all the more success. This, the ninth annual event, was held, like its predecessors, in the Palais du Cinquantenaire, a large hall well suited for the purpose, and tastefully and uniformly decorated for the reception of the automobiles. Although all the leading European firms are present, the show is not distinguished by the appearance of any new models, as in the absence of the Paris salon the makers did not think it worth their while to get these out.

The American exhibits comprise Mitchell, with a full line shown by the recently appointed Paris agent, René Petard, and Ford, which has been on the European market for a considerable time. There are also several American exhibits of tires and accessories.

Aeronautics are an important section. The dominant feature of the hall is the dirigible balloon "Belgica," built in France, but fitted with a Pipe (Belgian) motor of 160 horsepower. This is partially inflated and suspended from the roof. The car beneath it can be reached by the spectators from stairways on each side, and this opportunity to inspect at close range the fittings of a large dirigible is not neglected. Practically all the well-known aeroplane firms are exhibiting, among them being Antoinette, Santos-Dumont, Blériot, Voisin, Farman, Hanriot and a number of lesser Belgian constructors. Hanriot, though a comparative newcomer in this line, shows a monoplane of neat design, with skids for landing in addition to two wheels for starting.

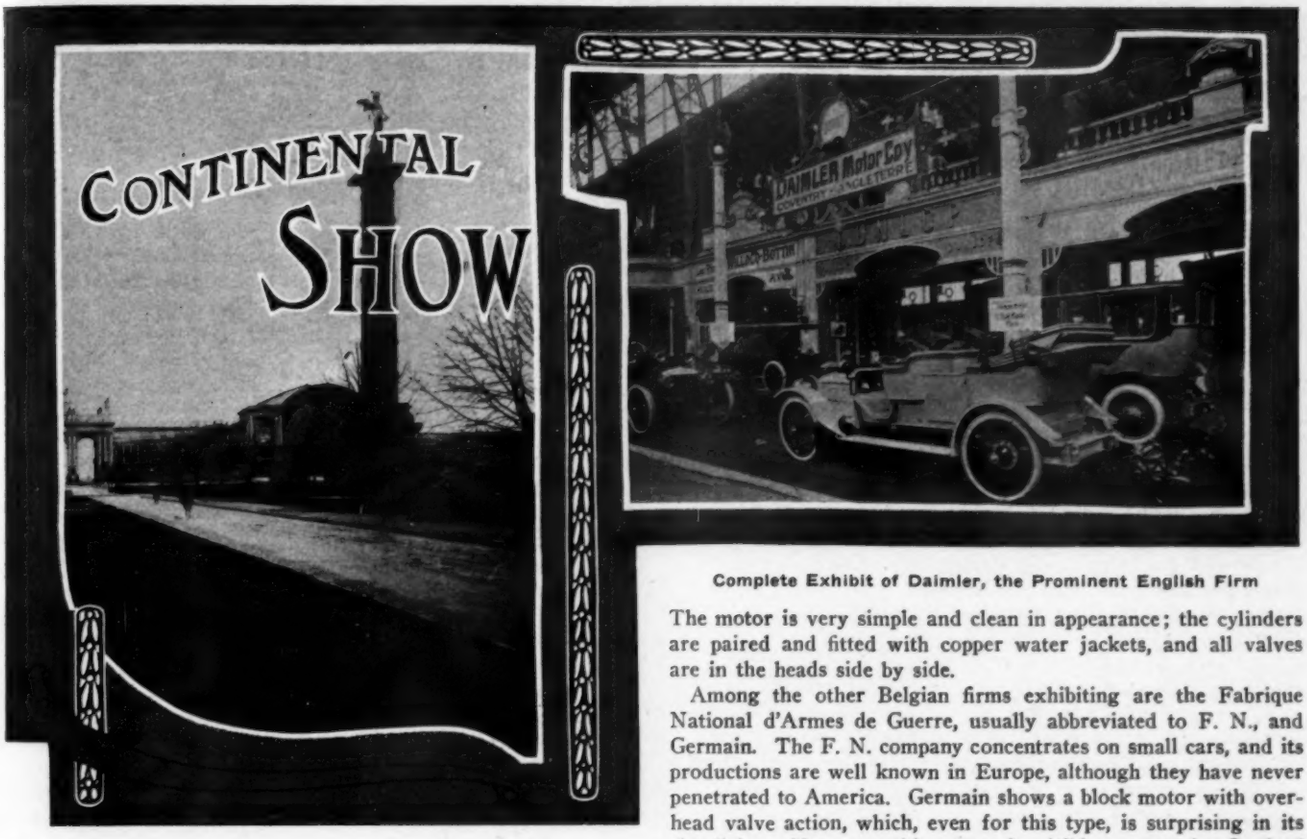
Minerva, a native Belgian, is attracting much attention with its exhibit of motors using the Knight slide valve. The 1910 line of this company uses this valve system exclusively, the motors being built in 16, 26 and 38-horsepower sizes, all four-cylinder. The exhibit includes a motor completely sectioned to show the working of the two sliding sleeves inside each cylinder. The camshaft which operates the sleeves is chain-driven.

On the Pipe stand interest centers about a large car with what may, in the lack of a more appropriate term, be designated as a limousine body; the outfit was specially designed for the crossing of the Sahara Desert. The car has a six-cylinder motor of 105 and 125 millimeters bore and stroke (approximately 4 1-8 by 5 inches). The rear wheels are fitted with twin pneumatic



Minerva Motor with Knight Slide Valves

Rochet-Schneider Idea of a Torpedo Body, with Left-hand Control



Complete Exhibit of Daimler, the Prominent English Firm

tires, like those used on light commercial cars. The body, however, is the real feature. The front part has two transverse open seats, like a wagonette; behind this is the closed part, which can be adapted for sleeping purposes. The rear end of the closed part is made in one solid piece, which can be let down flat on the ground to form a floor. A folding table, camp stools and an awning can all be stowed away in the body; when they are brought out and suitably disposed on the floor, the mid-Saharan desert will be transformed into a lunch-room.

Vivinus having had some success in the building of aeronautic motors is striving for more. It will be remembered that Roger Sommer once used an ordinary automobile-type Vivinus motor on his Farman biplane, and established a duration record with it. Now Vivinus has brought out a motor specially designed for aeroplane use, a four-cylinder said to develop 70 horsepower, and weighing 140 kilograms (about 300 pounds). The motor is very simple and clean in appearance; the cylinders are paired and fitted with copper water jackets, and all valves are in the heads side by side.

Among the other Belgian firms exhibiting are the Fabrique National d'Armes de Guerre, usually abbreviated to F. N., and Germain. The F. N. company concentrates on small cars, and its productions are well known in Europe, although they have never penetrated to America. Germain shows a block motor with overhead valve action, which, even for this type, is surprising in its simplicity. Not a working part is visible except the flywheel and the front extremity of the crankshaft.

The French firm of Rochet-Schneider has a fine example of the torpedo type of body, which is just penetrating to the Continent from its natural habitat, England. This car has the driver's seat on the left, with the levers in the center; this is a very convenient method of dodging the usual issue in torpedo bodies, namely, whether the levers are to be inside or outside of the body wall. Daimler, the first firm to adopt the Knight slide valve, has a good exhibit. All of its cars are fitted with detachable wire wheels. The worm-driven models are quite prominent. Some very neat body work, although not of the torpedo type, distinguished this English exhibit.

The Belgian constructors are jubilant over the success of their show. The obstinacy of the French manufacturers in refusing to back the Paris salon has resulted in a great boom for the industry in the sister country.

Pipe Car for Crossing the Sahara Desert; Showing Collapsible Lunch-Room

Vivinus Four-Cylinder Aeronautic Motor

AUTOMOBILE TRADE CREDIT MEN MEET

THE fourth annual meeting and dinner of the Automobile Trade Credit Association was held at Hotel Astor, New York, on January 19. This association is a very broad one, and its influence upon the trade at large is far greater than would be suspected. Believing that there is strength in union, this meeting is held each year for organization and a review of the situation.

The following were represented:

Lovell-McConnell Mfg. Co., by Messrs. Lovell, Turner & McConnell.
C. Cowles & Co., by L. C. Cowles.
Hartford Suspension Co., by Messrs. Waterman, Montgomery and Burnett.
N. Y. & N. J. Lubricant Co., by Mr. Barnes.
Continental Caoutchouc Co., by Mr. Lemal.
American Thermo-Ware Co., by Mr. Marshutz.
Motor Car Equipment Co., by Messrs. Kaufman & Lowe.
Nonpareil Horn Mfg. Co., by Messrs. Cohn & Arlitz.
Royal Equipment Co., by E. B. Knowles.
Nathan Novelty Mfg. Co., by Edwin B. Nathan.
Westchester Appliance Co., by Henry M. Duncan.
Ajax Trunk & Sample Case Co., Messrs. Kallis and Berg.
Patterson, Gottfried & Hunter, Ltd., by Charles H. Kreuger.
Mutual Auto Accessories Co., by Messrs. Phelps and Nesbit.
N. Y. Sporting Goods Co., by C. T. Hutcheson, J. B. Koebler.
Class Journal Co., by E. M. Corey.
Automobile Topics, by E. E. Schwartzkopf.
Motor World, by Jos. Goodman.
C. F. Splitdorf, by Messrs. W. J. Murray, Murphy and Schindler.

During the past year the following firms were elected to membership:

Aluminum Foundry Co.,	Manitowoc, Wis.
Ball-Fintze Co.,	Newark, O.
Grossman Co., Emil,	New York City.
Hoyt Electrical Instrument Works,	Penacook, N. H.
Havoline Oil Co.,	New York City.
Hagstrom Bros. Mfg. Co.,	Lindsborg, Kan.
Hazen-Brown Co.,	Brockton, Mass.
Jeffery-Dewitt Co.,	Newark, N. J.
Lovell-McConnell Mfg. Co.,	Newark, N. J.
Mutual Auto Accessories Co. of America,	New York City.
Motor Field,	Denver, Colo.
Nonpareil Horn Mfg. Co.,	Brooklyn, N. Y.
Reading Steel Casting Co.,	New York City.
The Rutherford Rubber Co.,	Rutherford, N. J.
Swan & Finch Co.,	New York City.
Standard Automobile Supply Co.,	Chicago, Ill.
Sonneborn Sons, Inc., L.,	New York City.
Union Battery Co.,	Belleville, N. J.
Westchester Appliance Co.,	New York City.
Wright Cooler & Hood Mfg. Co.,	Chicago, Ill.

Messrs. Carl Kaufman (Motor Car Equipment Co.), Michael J. Martin (Geo. A. Haws) and J. J. Cohn (Nonpareil Horn Mfg. Co.) were elected to fill vacancies on the Board of Directors.

Acting President Carl Kaufman was in the Chair during the business session, and Charles H. Krueger, of Patterson, Gottfried & Hunter, acted as toastmaster during the dinner, which was much enjoyed by all in attendance, as well as the guests.

THE AUTOMOBILE CALENDAR

Feb. 5-12.....Chicago, Coliseum, Ninth Annual Automobile Show, National Association of Automobile Manufacturers. S. A. Miles, General Manager.
Feb. 8-14.....Los Angeles, Cal., Grand Avenue Rink, Automobile Dealers of Southern California, Automobile Show.
Feb. 14-19.....Buffalo, N. Y., Broadway Arsenal, Eighth Annual Automobile Show, Automobile Club of Buffalo. Dai H. Lewis, Manager, 760 Main street.
Feb. 14-19.....Hartford, Conn., Foot Guard Armory, Third Annual Show, Hartford Automobile Dealers' Association.
Feb. 14-19.....St. Louis, First Regiment Armory, Fourth Annual Automobile Show, St. Louis Automobile Manufacturers' and Dealers' Association, Robert E. Lee, Manager, 1629 Washington avenue.
Feb. 14-19.....Rochester, N. Y., Convention Hall. Third Annual Show, Rochester Automobile Dealers' Association. Captain C. A. Simmons, Manager.
Feb. 15-19.....Washington, D. C., American Automobile Association's National Legislative Convention.
Feb. 17-19.....Grand Rapids, Mich., First Annual Automobile Show, Grand Rapids Automobile Club.
Feb. 19-26.....Minneapolis, Minn., Third Annual Automobile Show, Minneapolis Automobile Association. Walter R. Wilmot, Chairman, Hotel Nicollet.
Feb. 19-26.....Newark, N. J., Essex Troop Armory, Automobile Show, New Jersey Exhibition Company.
Feb. 19-26.....Los Angeles, Cal., Hamburger Building, First Annual Show, Licensed Dealers of Los Angeles.
Feb. 19-26.....Salt Lake City Auditorium, Automobile Show, Utah Automobile Dealers' Association. W. D. Rishel, Manager, 1-5 East First South street.
Feb. 19-26.....Cleveland, Central Armory, Annual Automobile Show under auspices of the Cleveland Automobile Show Company. H. M. Adams, Secretary.
Feb. 21-26.....Cincinnati, Music Hall, Automobile Show, Automobile Club of Cincinnati. Jesse Lippencott, Chairman Exhibits Committee, Gibson House.
Feb. 22-26.....Baltimore, Second Annual Automobile Show, Auto Club of Maryland, Fifth Regiment Armory.
Feb. 21-26.....Portland, Me., Auditorium, Fifth Annual Automobile Show. F. M. Prescott, Manager.
Feb. 22-27.....Milwaukee, Wis., Auditorium, Second Annual Automobile Show, Milwaukee Automobile Club.
Feb. 24-26.....Binghamton, N. Y., State Armory, Automobile Show. R. W. Whipple, Secretary.
Feb. 24-Mar. 3....Toronto, St. Lawrence Arena, Canadian Automobile Show, Ontario Motor League. E. M. Wilcox, Mgr.
Feb. 28-Mar. 5....Omaha, Neb., Auditorium, Automobile Show, Omaha and Council Bluffs Automobile Dealers.
Feb. 28-Mar. 5....Kansas City, Convention Hall, Fourth Annual Automobile Show, Kansas City Automobile Dealers' Association.
Mar. 5-12.....Boston, Mechanics' Building, Eighth Annual Automobile Show, Boston Automobile Dealers' Association. Chester I. Campbell, General Manager, 5 Park square.
Mar. 5-12.....Des Moines, Ia., Coliseum, First Annual Automobile Show, Des Moines Automobile Dealers' Association.
Mar. 7-12.....Albany, N. Y., Armory, Automobile Show.
Mar. 12-19.....Syracuse, N. Y., State Armory, Automobile Show, Syracuse Automobile Dealers' Association.
Mar. 17-19.....Louisville, Ky., Armory, Louisville Automobile Dealers' Association Annual Automobile Show.
Mar. 21-30.....Buffalo, N. Y., Convention Hall, Third Annual Power Boat and Sportsman's Show, Buffalo, Launch Club. D. H. Lewis, Mgr., 760 Main St.
Mar. 21-28.....Denver, Col., Convention Hall, Denver Motor Club's Annual Automobile Show.
Mar. 26-Apr. 2....Pittsburg, Pa., Duquesne Garden, Fourth Annual Show, Automobile Dealers of Pittsburg. Frank D. Sauppe, Chairman.
Mar. 26-Apr. 2....Montreal, Coliseum, Motor and Sportsmen's Show. E. M. Wilcox, Manager.
Apr. 23-29.....Bangor, Me., Auditorium, Second Annual Eastern Maine Automobile and Motor Show. J. Henry Graham, Manager, Old Orchard, Me.

THE AUTOMOBILE

Vol. XXII Thursday, February 10, 1910 No. 6

THE CLASS JOURNAL COMPANY

H. M. SWETLAND, President
A. B. SWETLAND, General Manager
231-241 West 39th Street, New York City

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Other Countries in Postal Union, including Canada - - - - One Year, 5.00
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FOREIGN SUBSCRIPTION AGENTS

ENGLAND:—W. H. Smith & Sons, Ltd., 186 Strand, London, W. C., and all bookstalls and agencies in Great Britain; also in Paris at 248 Rue de Rivoli.
FRANCE:—L. Baudry de Saunier, offices of "Omnia," 20 Rue Duret, Avenue de la Grande Armee, Paris.
GERMANY:—A. Seydel, Mohrenstrasse 9, Berlin.

Entered at New York, N. Y., as second-class matter.
The Automobile is a consolidation of The Automobile (monthly) and the Motor Review (weekly), May, 1902, Dealer and Repairman (monthly), October, 1903, and the Automobile Magazine (monthly), July, 1907

WHAT ARE DANGERS OF IMMEDIATE FUTURE?

It is claimed by some that the growth of the automobile business is at a rate so rapid that it will act as a sponge and draw wealth from other industries so appreciably that they will suffer, and, in the course of time the reaction which will set in will be to the detriment of the automobile industry.

This claim, if it has any foundation at all, is not working out in the fullest accord with its sponsors. The machine-tool industry would have gone to the wall just after the panic were it not for the demands which the automobile business made on the machine-tool manufacturers; a demand which has been so heavy and persistent that it has pre-empted nearly all the time of every machine-tool maker who was capable of doing even reasonably fair work.

There is no reason why an industry, even if it does grow and prosper, should damage any other branch of trade or manufacture; if some other industry is in the throes of overproduction, as the machine-tool situation seemed to have been, business from some newer source will always be the medicine which will cure the malady.

The real way to get at the facts in a matter of this sort, is no different from the method which must be pursued in an attempt to ascertain as to the food value of potatoes, or the fuel value of coal. Energy is what must be kept track of in every case. Food is measured, in determining its value, by ascertaining its heat units (the energy contained in a pound of the food). Fuel is counted in the same way, and, when the force of an industry is properly gauged, it will be found that accuracy will creep in if the energy engaged is counted.

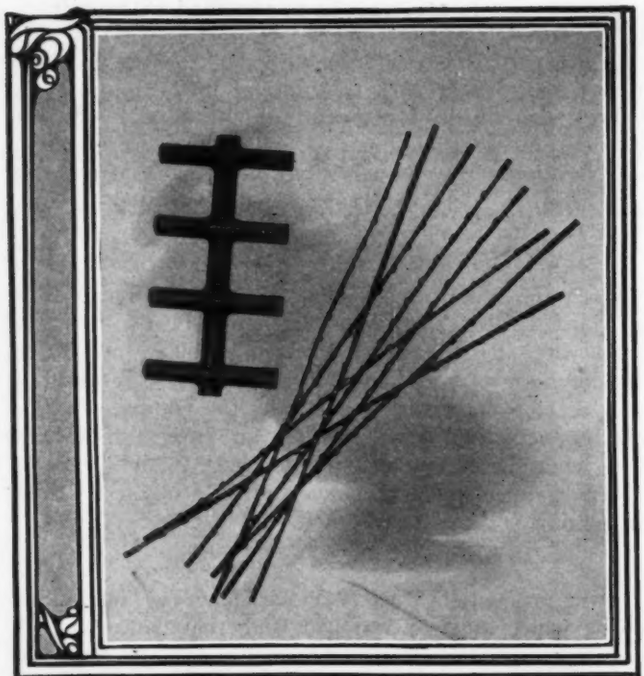
Fuel, if it takes on the characteristics of dynamite, is so concentrated that it must be handled with care, and food, when it is too rich, is likely to result in indigestion. In the same way, if an industry is over energized, it will become congested. This was the condition of the machine-tool industry—showing an excess of energy, and, when the automobile situation hove in sight, in want of energy, it tapped the excess of the other, resulting in good to both.

Over production, then (excess of energy), is the condition which must be watched, and, that the automobile industry is on this basis is not believed. The time may come when the fathers of the industry will see the need of applying the brakes; that they have a set, is well understood by all who have skill enough to appreciate the status of the industry.

The second-hand car situation is a little threatening; some phases of it must be treated with, and it is a question of some portent; a matter which may have to be mastered by the makers before the end of the chapter. Perhaps, as once before suggested, makers will find a way to control the repair and further exploitation of second-hand cars, and, if they are in a state of decay beyond repair, it may be desirable to fund a holding company which will sustain the loss.

In the rush to deliver a larger number of automobiles than last year, it may be that some of the relatively unimportant details will be given less attention than they should receive; this will be a great detriment to the industry; each person wants but one automobile; he is entitled to a good one; the price demanded should suffice for the purpose, but there should be no question as to the quality of the automobile any more than there should be a question as to the soundness of the currency demanded.

Materials, when they are required to do kinetic work, must be especially fabricated for the purpose, and if this important matter is overlooked, it is a corps of failures that will greet the eye of the historian. It is to be hoped that history will not be of the kind which will tell of failures of this character, nor is it to be expected that the makers who have gone through this phase of the undertaking will be so short of vision as to play the part of the penny wise. Progress has been made in this direction, but it is difficult to get steel men to realize the necessity of doing their best, and unfortunately, it takes months, even years, to bring a series of experiments to a point where the deduction may be relied upon.



NEW EDISON BATTERY

SIX years ago Thomas A. Edison announced that he had succeeded in solving what was then termed "The storage battery problem." The first battery which Mr. Edison placed upon the market was known as Type E, and it differed from the then prevailing types of storage batteries. The Edison battery belonged to the alkaline electrolyte series, whereas the prevailing types of batteries at that time were of the lead-lead series, in which the active material was peroxide of lead and the electrolyte was diluted sulphuric acid. There were other types of batteries, but they failed to impress commercial users for divers reasons which will not be explained at this time.

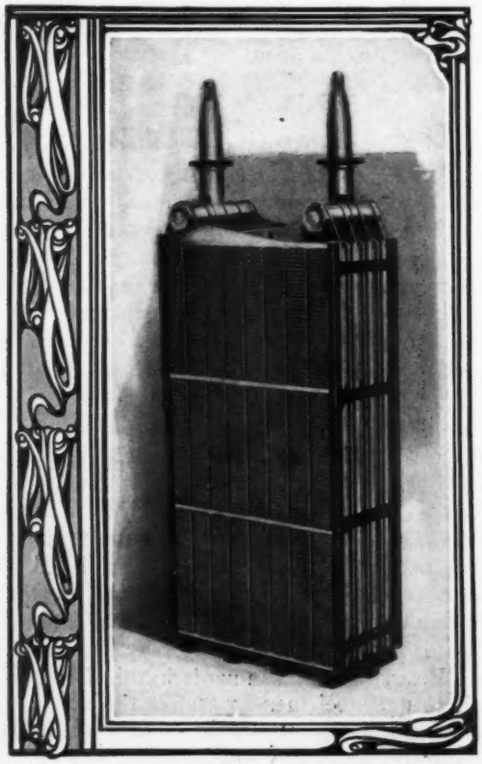


Fig. 1—Showing positive and negative plates of the A-4 Cell assembled together, but removed from the container.

The type E Edison battery, while it may not have accomplished as much by way of an invasion of the market as the public might have expected, did survive, and the electric vehicle problem was given an extra impetus as a direct result of its use.

That Mr. Edison was not as well satisfied with the Type E battery as the users thereof, is proven by the fact that the Edison Storage Battery Company of Orange, N. J., is now offering what is known as the new Edison battery, and is commercially catalogued as Type A. A cell of this battery is composed of four positive plates, when it is called Type A-4; likewise, if the plates are increased to six it is then called a Type A-6 battery.

The alkaline electrolyte is used in this battery just as it was in the first battery produced by the Edison Company, and the difference lies in structural refinements, a better understanding of the electrochemical phenomena, and data which has been turned to good account. In battery construction, as in other lines of work, experience is the best teacher.

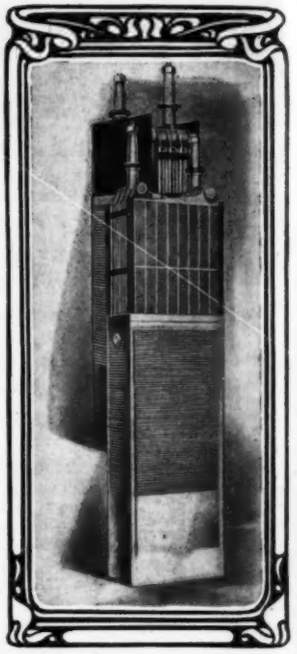


Fig. 2—Type A-4 Cell with contents of container partly lifted, showing alternating positive and negative plates assembled and connected with positive and negative poles, respectively.

In the new Edison battery the active materials are oxides of nickel and of iron. The nickel oxide is placed in the positive grids and the iron oxide is lodged in the negative electrodes. The electrolyte is a solution of caustic potash in water.

The retaining cans are made of sheet steel. In the process of manufacture, the sheets are rolled into the required shape, and the seams are made permanent and tight by the autogenous welding method. To limit weight as much as possible, the sheets of steel are selected with the idea of having to corrugate them in order to induce the required measure of strength. The cans, when so made, are electroplated with nickel, and the desired close union of the steel and nickel is obtained by fusing them together. This coating of nickel is primarily given to prevent rusting, but it is also recognized that it adds materially to the general appearance of the cans.

Since the only diperence between the Type A-4 and the Type A-6 cells is due to a difference in the number of plates used, any further description may well be confined to the Type A-4 cell, and its combinations. As before stated, the Type A-4 cell is made up with four positive plates, and since it is desirable to have a negative plate on each side of each positive plate, five negative plates are employed.

Each positive plate consists of a grid of nickelplated steel, binding into intimate relation 30 tubes, each one of which is filled with active material. These tubes are arranged in two rows of 15 each.

The tubes are made of sheet steel, relatively thin, after the sheets are perforated, and when the tubes are completed they are then nickelplated. Eight stout ferrules are placed over each tube, the object being to so reinforce and strengthen the tubes that they will resist expansion which takes place when the battery is in active service.

The tubes are filled with a combination of active material and thin layers of pure metallic nickel in the form of leaves or flakes. The pure nickel flake is a product which is especially manufactured for the purpose by an electro-chemical process which was instituted in the Edison plant.

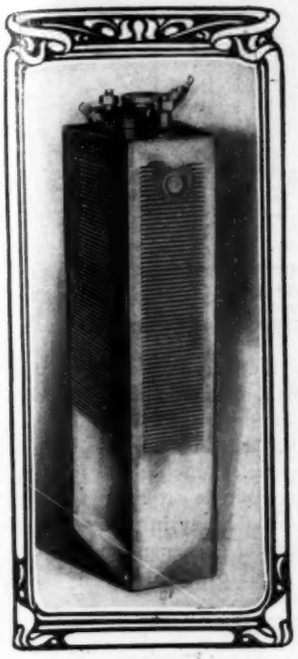


Fig. 3—Cell complete ready to go into a battery of cells.

Each negative plate comprises 24 flat rectangular pockets, supported in three horizontal rows in a nickel plated steel grid. These pockets are made of thin nickel plated steel, perforated with fine holes. The pockets are filled with oxide of iron.

The positive and negative plates are assembled alternately as shown in Fig. 2, and, as will be observed, all the positive plates are connected together by means of one cross bar, and all the negative plates are connected together in the same way by a second cross bar. The plates are exactly spaced by means of spacers which are made of tubing, and which measure the distance between the respective plates, being held in proper relation by the bolts, which serve as the connecters.

Each cell of battery, according to this description, is composed of an even number of positive plates, which are flanked by an odd number of negative plates. The outer surfaces of the outer negative plates are insulated from the retaining can by means of hard-rubber sheets. As a further means of insulation, hard-rubber pieces are fixed between the cans and the sides and bottom edges of the plates. Additional protection is maintained through the use of hard-rubber rods inserted between the plates. When the elements are placed in the cans, the covers are put on and tightness is secured by autogenously welding the covers to the cans.

The covers are designed in such a way that the columns of the positive and negative plate connecters pass through stuffing box apertures, these boxes being a snug fit in order that the electrolyte will not slop out, and are shown in the cover, which is placed beside the can in Fig. 6. In order that the electrolyte may be replenished from time to time as the exigencies of service will demand, a filler opening is provided, and a cover maintains tightness of the filler, excepting when it is removed for the purpose of adding distilled water to take the place of that which is evaporated during the time when the battery is in operation or undergoing the process of charge. There are many nice refinements in connection with the design, as, for illustration, the water cap is so made that it will fly open unless the catch is properly adjusted, the idea being to indicate to the operator when the caps are properly secured.

The strength of the electrolyte is that which will follow when 21 per cent. solution of caustic potash is dissolved in distilled water.

CAPACITY OF TYPE A-6 EDISON BATTERY

Charged Seven Hours at 45 Amperes. Discharged at 45 Amperes.

Ampere-hour input	315.0
Ampere-hour output	268.5
Average potential difference of charge	1.692
Average potential difference of discharge	1.202
Watt-hour input	533.0
Watt-hour output	322.7
Ampere-hour efficiency (per cent.)	85.2
Volt efficiency (per cent.)	71.1
Watt-hour efficiency	60.6
Output per pound in watt-hours	16.8

The curve falls quite rapidly from 1.50 to 1.30 volts within 30 ampere-hours discharge, falls from this level to 1.20 between 30 and 150 ampere-hours discharge, and falls to 1.11 between 150 and 240 ampere-hours discharge. From this point on, the voltage falls with great rapidity, reaching as low as 1 volt per cell between the discharge 240 and about 268 ampere-hours. These values are approximate, and would necessarily vary over a considerable range under different conditions.

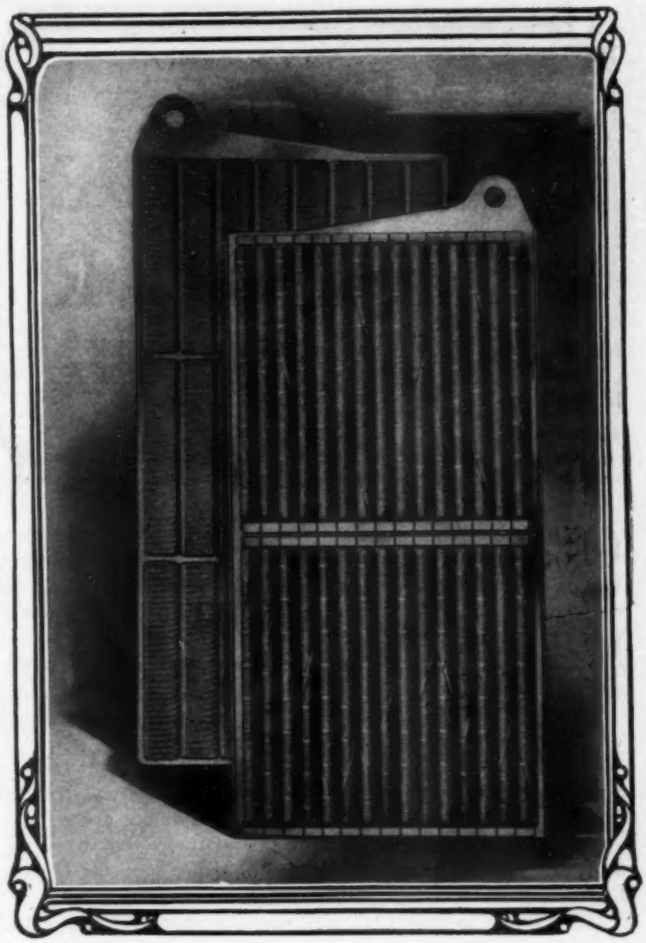


Fig. 4—Type A, positive and negative plates, showing the different structures of each, one tubular and one rectangular.

On charge the voltage goes up from 1.45 approximately to 1.64 at a steep rate, say, before the input reaches 40 ampere-hours. The charging voltage remains at about 1.67 until the charge reaches a little more than 180 ampere-hours. Beyond this point in the charge the voltage increases and reaches 1.80 when the input is equal to about 285 ampere-hours. The watt-hour output is equally high.

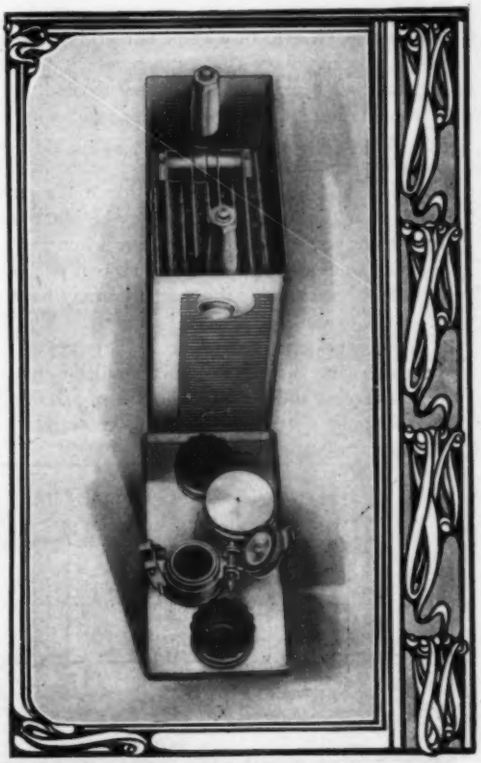


Fig. 5—Type A-4 Cell, showing the positive and negative plates in the container, and also showing the removed cover with openings.

IN THE GARAGE REPAIR SHOP

OVERHAULING an automobile seems a simple undertaking, if machinists of some skill are employed in the process. It would be perfectly simple were all automobiles so made that the parts would be interchangeable in fact. This condition, while it is said to obtain in every car made, is, nevertheless, so very difficult to realize that it is doubtful if it positively exists in even a reasonable percentage of automobiles.

This question of interchangeability has two important phases. They may be separated from each other as follows:

(A) Connecting members of ordinary importance may be so nearly interchangeable that a little "shake" makes no great difference, unless its magnitude is sufficient to induce noise.

(B) Relating members of ordinary importance may be so near a proper fit that a little "lapping" will suffice to make them go together.

(C) Certain members, as ball bearings, may require a "sucking" fit, and this precise condition may demand that the very bearing which is removed from a given spindle will have to be put back on the same spindle.

Considering the specific conditions as above enumerated, it follows that an artisan may be skilled in some of his divers ways, but he may not have the acumen which will be necessary if the parts, as ball bearings, have to be marked, kept track of, and at the proper time be put back on the exact spindle from which they may have been taken. The first point of importance, when it comes to repairing an automobile, according to this method of reasoning, will be suitably cared for if the parts are "spotted" as they are removed, so that they may be identified with the position which they are supposed to occupy when the car is reassembled.

Unless some well understood system of spotting is contrived, it will be necessary for the man who may have made the identifying marks to do all the work of reassembling, for the reason that no other workman would be in a position to determine as to where the parts belonged. This condition means additional work, with much cost added also. The cost of assembling under such conditions would necessarily be high, but unfortunately what really does happen in nine cases out of ten is that the identifying marks are totally disregarded if in the assembling process the parts will go together, which, however, is excellent assurance of the fact that the car will not be assembled in a manner which will favorably compare with its condition when it left the works of the maker.

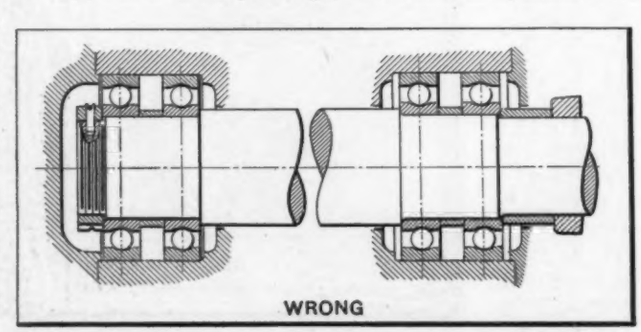


Fig. 1—Wrong nesting of ball bearings which support the two ends of a long shaft.

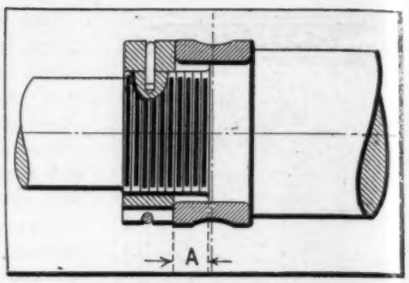


Fig. 2—Method of clamping inner raceway of an annular type ball bearing, showing threaded ring and locking device.

In some of the relatively old models of automobiles, the annular types of ball bearings were not fitted into place in full accord with present standards, and it is just these cars which are now likely to visit the repair shop. The earlier practice was to fit the inner raceway to its bearing on the spindle so tightly that by virtue of the pressure generated it would stay in place—a press fit. This character of fit served every end when the material of the spindle was of some excellent grade of alloy steel, properly heat-treated. In many cases, however, the steel was of a softer variety and the press fit failed to serve the end, so that the inner raceway of the bearing so fitted loosened up on the shaft and burrowed into it.

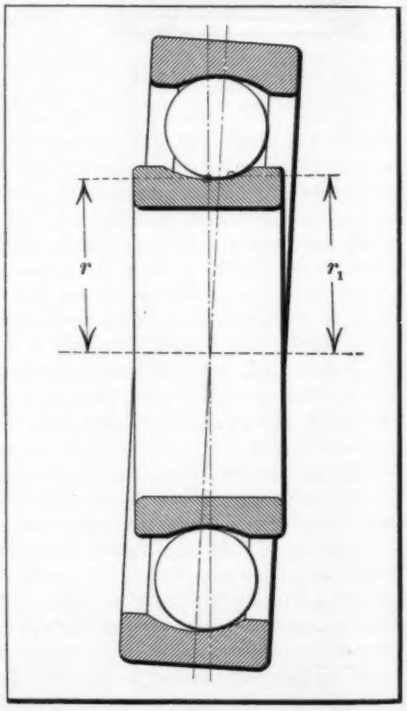


Fig. 3—Showing position which is assumed by a ball bearing if the outer raceway is pushed over to one side.

When this difficulty reached sufficient prominence to warrant giving it specific attention, the problem was taken up by Henry Hess of the Hess-Bright Ball Bearing Company, and this company thereafter issued specific instructions to the effect that the inner raceway should be a sucking fit on the shaft, and it should fetch up against the shoulder, using a threaded ring or other suitable nut for the purpose, and the nut in turn should be locked after it is screwed up tight. Fig. 2 shows just how this fit is made with the threaded ring and the wire lock. In this particular example, it would seem as if the distance (A) is excessive, but it accentuates another point very thoroughly, i. e., the thread should be cut back for a sufficient distance under the inner raceway so that the locking ring may be screwed up without interference, which latter condition is frequently present when the design is cramped, and a condition of give and take is not allowed for.

In making a repair, if account is taken of the conditions as above enumerated, the repair man will necessarily make an effort to have the inner raceway fit snug on the shaft in every case, and, when possible, employ some locking rings for the purpose of clamping the inner raceway so that it will not float on the shaft, and so tightly that it will not rotate, excepting with the shaft. It

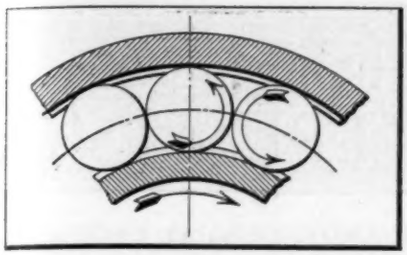


Fig. 4—Portion of an annular type ball bearing, showing directions of rotation of inner race and balls.

may be a little difficult in some of the older designs of automobiles to bring about this desirable condition, but it is well worth striving for, and it is the repair man who takes these nice details into account who will deliver the greatest measure of satisfaction, and number among his customers those who are willing to pay liberally if the results obtained are in keeping with the promises which have been made.

Annular types of ball bearings are capable of taking thrust as well as radial loads, but unless the thrust load is to be taken, it is important that the outer raceway be given a certain axlewise freedom, and the fit of the outer raceway in the bore of the housing should be barely "snug." If the bearing fetches up against the shoulder which will crowd the outer raceway when the inner raceway is clamped into its right position, the bearing will be crowded over as shown in Fig. 3 during a part of its rotation, which condition will be brought about by deflection of the housing or the spindle. If it is not crowded over diagonally as shown, it will at least be displaced so that the balls will press against the curvature of the races instead of rolling in the normal position as shown in Fig. 5. That the bearing will last as long under such conditions is scarcely to be expected, and that it will fail in service is assured, unless it is much too large from the point of view of normal service.

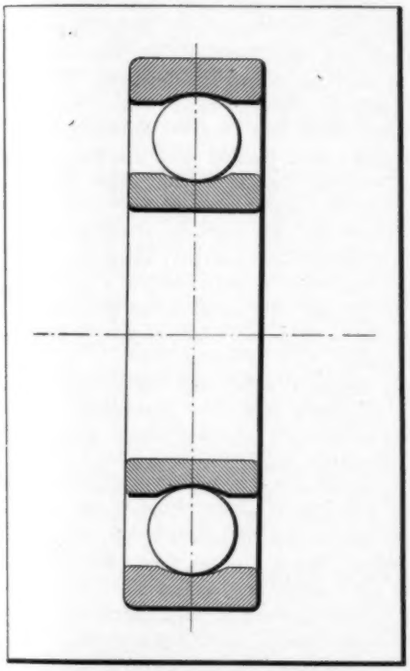


Fig. 5—Showing an annular type ball bearing and the correct position of the outer race when it is not interfered with.

In the types of bearings as illustrated in Fig. 6, when they are removed and cleaned it is desirable to inspect the spring separators and ascertain if they are in good condition. They should be sufficiently elastic to take up all lost motion, and if they are not, the best thing to do is to replace them by new spring separators, which can be made by a man of some deftness, or replacements may be had from the maker.

Figs. 1 and 7 are offered to show the difference between right and wrong when a plurality of bearings are correlated; that the shaft, if it is long, will deflect is a certainty, and in Fig. 1 it will be seen that the condition established is one which will cause the bearings to be pinched if the shaft does not deflect. Fig. 7 presents a design which is a corrective for this evil, due to the curvature of the housings for the bearings. Compensation is established, since the shaft deflection, instead of resulting in the cramping of the bearings, causes motion of the bearing housing against the surface of the shell.

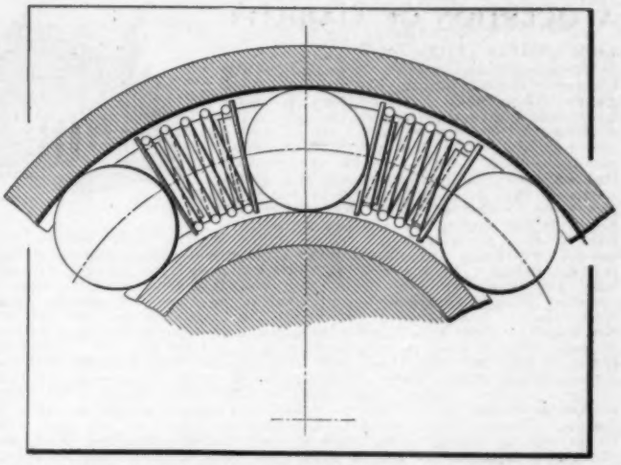


Fig. 6—Presents a portion of the silent type ball bearing, with spring spacers placed to maintain the proper distances of balls

The owner of a car who waits until he hears a squeak before he ascertains what an oil can is for is the customer whom the garage repair man relies upon for most of his income.

PROPER MAINTENANCE DEFERS NECESSARY REPAIRING

When annular types of ball bearings are used, if they are sufficiently large for the work they must do, and are provided with housings so designed that grease or other hard lubricant will be retained, the grease will have its tasks as follows:

(A) As a lubricant, it will have but little work to do.

(B) As a buffer between the balls it is worth considering, although the condition of rubbing, which is apparently indicated in Fig. 4, is scarcely worth taking into account, since the balls automatically space so that they do not actually contact after the speed reaches a certain point.

(C) The grease must serve as a preservative of the polished surfaces of the balls, and prevent rust from forming.

(D) The grease is also required in its capacity as a seal for the purpose of excluding foreign matter, as sand, fine dust, etc.

Any form of hard grease will have sufficient lubricating property (unctuousness) to satisfy the condition (A). The condition (B) is readily satisfied by any form of grease, or even oil, which will coat over the surfaces, especially of the balls, and serve as a cushion. The condition (C), however, is much more exacting. Any form of grease which holds in its composition such compounds as will attack and etch the polished surfaces is of the greatest detriment to the balls and the races.

It is frequently claimed that oil or grease which is the product of animal or vegetable matter is acid-producing under certain conditions, or may have free acid in its makeup. There is a certain amount of truth in this story, and in selecting lubricants which are made from animal or vegetable matter, it is necessary to exercise care, and it may even be desirable to consult the makers of reliable lubricants of this character, and procure from them the types of their products which are free from etching proclivities. This is not by any means a difficult task.

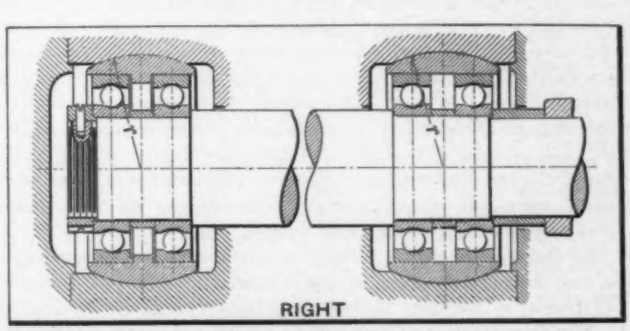


Fig. 7—Shows the right method of assembling dual ball bearings at the two ends of a long shaft.

A QUESTION OF LIABILITY

Editor THE AUTOMOBILE:

[2,160]—Kindly answer the following through the columns of your valued paper. If you can cite any legal authorities that cover this matter, do so. A is driving his car on a dark, rainy night, has top and windshield up, and is using second speed. The streets are poorly lighted and rain has covered the glass front so that it is impossible to see out. Driver is on the left hand side of the car track going south, and getting to a corner where he wishes to turn east. At or just before the corner he runs into a buggy. The first knowledge he has is the crash. When looking out he sees the buggy on one side and then on the other a horse breaking away. Car is stopped within three feet and levers show second speed. Man with buggy was looking for street car and claims he did not see machine until crash came, but saw it in time to throw horse off to east side of road to escape having it hit by the car. Light on front of car, left side, had been lighted, but was put out without knowledge of driver either before or after crash, or else at the time of the accident. Driver found man was thrown forward when horse broke away and hit his nose on dash of buggy, breaking bone, he claims. Query: What liability attaches to driver of car and what to driver of buggy? Automobile had lamps smashed and was otherwise injured. It was a pure case of accident, with no intentional injury. Driver of automobile rendered all possible assistance to people in buggy. Is he liable? If so, for what amount? And, in fact, would it be anything at all, or anything beyond actual repair to buggy and medical service. FRANK COOK.
Des Moines, Ia.

Although it is not anywhere so stated, we take it that the driver of the buggy was on the east side of the road, proceeding north, that is on his right side as he should be. The driver of the automobile, on the other hand, was on the wrong side of the road, simply as a matter of personal inclination or convenience, as the letter puts it, "he is getting to a corner where he *wishes* to turn out." In doing this he violates the rule of the road and drives on the wrong side. If in the course of such driving, as in the case cited above, he meets and damages a rig, whether another automobile, a horse-drawn vehicle, or any other, does not matter in the least. He (the automobilist on the wrong side) is liable not only for all repairs, but also for damages in the case of personal injuries, which the law usually considers as more than the cost of actual medical assistance. There is not a single thing that can be said in favor of the automobile driver's position in this case, the night in question being the very last one on which a sensible driver should try such a short cut. As the matter stands, the driver of the automobile was wrong from start to finish and should settle at the other man's terms. Apparently, no blame whatever attaches to the driver of the buggy.

PROPER GEARING FOR STEEP HILLS

Editor THE AUTOMOBILE:

[2,161]—I have an Oakland "20" 1909 car, which seems to lack power on hills, and particularly in deep sand, of which we have a lot in this part of the country. On ordinary roads the car runs fine, and I can find no fault, but some of the hills up this way are very steep and long. Then, too, there are lots of them, so that the car is in trouble often. It is a two-cylinder 4 1-2 by 5 engine, planetary transmission, shaft drive, and geared to a 4 to 1 ratio. Can you offer any suggestions whereby I could get more power out of my present equipment? Could the 4 to 1 gears be changed for a set of 5 to 1 gears without changing the bearings? Can you give me the address of the Warner Gear Company, who were the makers of the gears on my machine; at least I think so? MORE POWER.
Florence, Wis.

From the description which is given and the knowledge we have of the usual performance of these cars, we are forced to the conclusion that the trouble is with the gearing used and the surrounding country, rather than with the engine. Although it will depend entirely upon the dimensions of the differential gear housings, of which we do not have the figures, the change from 4 to 1 to 5 to 1 is otherwise feasible. If it should be found that this change is impossible, why not make a smaller change, such as to 4 1-4 or 4 1-2 to 1 in place of the present gearing? Even the slight change first suggested (4 1-4 to 1) changes the speed of the car, lowering it by 6 1-4 per cent, and raising the hill climbing and pulling ability by the same amount.

In making the change, it will be found that the lessened speed is not any too agreeable, so that it is wise to lower the gear ratio as little as is necessary to secure the hill-climbing ability required.

The Warner Gear Company, to whom you have reference, is located at Muncie, Ind., where they should be addressed.

HORIZONTAL AND VERTICAL ENGINES

Editor THE AUTOMOBILE:

[2,162]—I am very much interested in stationary engines of the four-cycle type, and would like to have you state a comparison between the vertical and horizontal types, giving the advantages and disadvantages of each. What are the proper angles on the crankshaft for the various places of beginning and ending the valve actions and firing operations? Will you please explain the low-tension ignition system as used with the Splitdorf single unit coil and magneto for four-cylinder work, as on the E-M-F car, for instance?
Whitehall, Mich. L. GEE

In general, the comparison of the two types of stationary engines is based upon the matter of saving of space, both vertically and horizontally. It is considered that in the usual power plant there is sufficient height for any purpose, while the floor area is limited. If then two engines of equal power occupy respectively 8 square feet of floor space by 6 feet high, and 36 feet of floor space by 3 feet high, there is hardly any doubt as to which one will be chosen, height being cheap, while floor space costs money. As to other considerations, the only one worthy of devoting space to is the matter of valves and valve location. On the horizontal engine the valves are usually placed horizontally and bear on a vertical seat. Gravity acting upon the valve tends to make it wear the seat more on the lower side than the upper, thus leading to frequent regrindings, and trouble with leakages in between grindings. The vertical engine, on the other hand, has the valves vertically and the seats horizontally. The action of the weight of the valve and the strength of its spring are both acting all around the surface, no one part being worn more than another. This small difficulty is overcome by some makers of horizontal engines by setting the valves vertically, in which case the choice between the two types becomes a matter of available floor space and its value.

As to valve settings, opinions differ, but an average valve setting would be (all measured upon the crankshaft): Inlet opens at 10 degrees past center and closes at lower center or 10 to 20 degrees past. Compression from this point to upper center. Fire at small angle past, angle varying from 15 degrees for starting back to dead center for highest speed. Open exhaust valve beginning at 30 degrees before end of power stroke, holding it open up to the upper center and 5 degrees past. Interval of 5 degrees, then open inlet valve again and repeat.

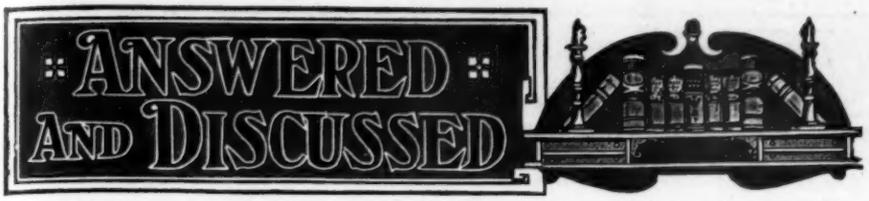
If the magneto and ignition system is understood exactly as it is meant, the magneto generates a low-tension current which is sent through the coil, to be stepped up to a high-enough voltage to jump the spark plug gap. In place of using a single vibrator for each section of the coil, but one is used, and all coil parts wired through that one. It must then vibrate just four times as fast as any single vibrator in the ordinary system, in which four vibrators are used. Otherwise the whole system is the same as any other so-called high-tension ignition system.

CASTOR OIL AND RESIN CEMENT

Editor THE AUTOMOBILE:

[2,163]—Would castor oil and resin make a cement to fasten canvas inside tire shoes? Has it ever been tried? W. T. K.
Nichols, Conn.

The cementing qualities of this mixture are hard to determine, although, as a matter of fact, neither one of them has any cementive properties worth mentioning. Castor oil won't stick to anything (not even to the human stomach) and similarly resin is a poor binder. Answering your last question, we have never heard of its being used, either one of the constituents or the compound. In preference to this muss, why do you not use one of the many excellent cements now on the market for this purpose?



A MULTIPLICITY OF BROAD QUESTIONS

Editor THE AUTOMOBILE:

[2,164]—Please answer some or all of the following questions in the columns of "The Automobile" and help an interested subscriber: 1. Why can you not have the greatest speed and greatest gasoline economy at one and the same time? 2. When was the Knight patent on a sliding sleeve engine issued? 3. Is the Ledru type of rotary sleeve engine patented; if so, when? 4. In a worm drive, using a driven worm of 5-inch diameter, and a small worm driving it, with teeth of a high pitch, what is the greatest reduction possible? 5. I have a good theoretical knowledge of automobiles and want to get a position at some factory in Detroit. What could I do and how should I proceed to get into touch with some of the factories there? C. W. S.
Albany, Ind.

Greatest gasoline economy is obtained by a very weak mixture, this reducing the amount of fuel used. Greatest speed on the other hand is obtained by a fairly rich mixture. So it is that the two may not be had simultaneously. If you refer to racing engines, these are usually constructed so as to obtain the maximum speed regardless of fuel consumption.

The Knight American patent has not yet issued, but is doubtless now in the Patent Office, which, however, is just as much protection to the inventor as if it had actually issued. The Ledru engine has not been patented on this side, but may possibly be patented in France.

Speed ratios or speed reductions as afforded by worm gearing vary with the number of teeth in the worm wheel and the threads of the worm. Then, if you fix the teeth in the driven wheel, the number of threads determines the speed reduction. Thus, if the single thread is used and gives a certain reduction, using a similar worm, but with a double thread, doubles the reduction. This may be carried on to the triple, quadruple and quintuple worms, the forms now in regular use. The pitch angle is usually fixed by considerations of economy, the proper angle resulting in an efficient power transmitter, while the wrong angle, either too large or too small, gives very inefficient driving, and consequent loss of power. The efficiency curve is flat topped, the efficiency with a 10-degree angle reaching about 80 per cent. Rising slightly above this in between, it comes down to the same point (80 per cent.) for a 78-degree angle. The actual maximum is reached at 45 degrees.

Nearly every factory in Detroit is at present seeking help in one department or another, so that a letter addressed to any one company will doubtless bring an immediate answer.

LEFT-HAND DRIVE AND WIDE TREAD

Editor THE AUTOMOBILE:

[2,165]—Will you furnish me with a list of all American cars which are now built with both left-hand drive and 60-inch tread for Southern roads? J. H. HODGES.
Gainesville, Fla.

Unfortunately for a direct answer to your question very few makers turn out a car with both features, although the number turning out each one of these separately is rather large. Thus the following make cars with 60-inch tread: A. B. C., Badger, Brush, Buggyaut, Cadillac, Cameron, Cartercar, Chalmers-Detroit, Cole, Cutting, E-M-F, Eureka, Flanders, Ford, Great Western, Hupmobile, Maxwell, McIntyre, Mitchell, Rambler and Reo. Of these only Brush, Ford and Reo have left-hand control, so that, as an exact answer to your question, the latter three are all that would be given.

Recent developments would seem to indicate that the left-hand drive is gaining in favor. The above list must not be taken as final for no attempt has been made to enumerate the cars which are driven from the left, but do not use wide tread. They are many.

CONE AND DISC CLUTCHES

Editor THE AUTOMOBILE:

[2,166]—Please discuss in your questions column the relative merits of the cone and multiple disc clutches. Which is the better clutch? Which is the better multiple disc clutch, the dry one or the one running in oil? J. M. I.
Cleveland, O.

Such questions remind one of the old friend, "How old is Ann?" Or, to put it otherwise, the return question might be asked, which is better, a silver dollar or a dollar bill? That about expresses the idea, it being impossible to state for a certainty that any one form is the absolute superior of all others. Each form of clutch has much to recommend it and, perhaps, a few faults. It noticing what the great majority of manufacturers are using as indicated by some such table of specifications as that to be found in the Chicago show issue of THE AUTOMOBILE, some idea may be had of popular demands. This, in reality, is what is turned out, without any idea of a "best." Actually, this is not so very far from an all-around best, for a majority of people would not want any one form if it did not have more commendable and less censurable features than the others.

So, too, with the second question, this is like asking which is better, a new silver dollar or an old one. The dry disc clutch has a number of advantages so weighty as to call for its adoption in the face of the reasoning that a clutch holds through friction, which means wear, the latter usually being reduced by the use of a lubricant. Up-to-date practice as expressed in percentages would tell an interesting story in this connection.

POINTERS ON PROPER TIRE INFLATION

Editor THE AUTOMOBILE:

[2,167]—All owners of automobiles as well as the trade will be interested in tests recently made at the factory of the Diamond Rubber company in Akron, with regard to the use of gas for inflating automobile tires as compared with the use of air.

The tests showed that gas in place of air will do for inflation of tires, if the user will but watch his tires and replace gas which escapes. But right here is the troublesome point. Not all owners watch their tires carefully enough, and even for those who do it is almost impossible to notice the constant leakage that goes on when gas is used. In one way or another gas will seep out of the tires by imperceptible degrees and more rapidly than air, as the Diamond Rubber Company's tests have shown the leakage of the best gas-filled tire was 43 per cent. greater than in any one of the air-filled tires.

The tests also served to emphasize the need of ample inflation of tires whether it be by gas or by air.

At the plant of the Diamond Rubber Company three tires were pumped by air to 100 pounds pressure each at 1:30 P. M. on October 14. At the same time three tires of the same size were inflated wtih carbonic gas to the same pressure. A week later, October 21, at 1:30 P. M., the three air-filled tires registered 92 pounds each, while the three-gas-filled tires stood 41, 50 and 51 pounds.

Should an owner pump his tires to 100 pounds with carbonic gas and not have a noticeable puncture he is likely to take for granted even a week later that he has been running with sufficient inflation. As a matter of fact, he really has only half enough, and during the intervening time considerable damage may have been done to the body of the tire.

The meat of these recent tests, previous tests and of many years of experience can be summed up in one terse sentence: Tires must be pumped up hard if they are to give maximum mileage. Speaking on this point Mr. Weigele, of the Diamond Rubber Company, said: "There is only one sure way of properly inflating tires so that they will give the most service of which they are capable, and that is to keep them pumped up so hard that they stand up full and round under a maximum load when in motion. If this is done there will be a decided increase in tire mileage.

The element of friction and heating is reduced by ample inflation, which also checks the movement within the tire and enables you to ride, as you should ride, on a cushion of air and not a cushion of rubber. And in this connection it is just as much the duty of the user to supply plenty of air as it is of the producer to supply good tires. Each expects the other to do his part, and the co-operation should be of mutual benefit. It will result in a reduced upkeep cost that must ultimately be of great benefit to the automobile industry.

Users should watch their tires, and when they do not stand up round under a full load, should immediately supply new air. The one safe rule is to do this at once, remembering that pressure gauges do not provide for the over-loaded tire, and four-fifths of all tires are frequently overloaded. The best available answer to the overloaded tire is the size of tire next larger than that usually applied. The only answer of any other kind is that of air, and still more air, and nowhere do the results show faster than in the service given by the tire overloaded as a regular thing.

Another thing that should be constantly kept in mind by the automobile owner is not to wait until all four tires are in need of air before using the pump. Don't let one tire get partially deflated and run your car in that condition. Not only is the effect very bad on the deflated tire, but the other tires are subjected to extra work that can only work injury to them.

Keep your tires pumped up hard—all of them—all the time.
Akron, O. JOSEPH W. CONNER.

Preheating the Mixture in Gasoline Motors

By Forrest R. Jones

PREHEATING the mixture of air and gasoline vapor just before it enters the cylinder or cylinders of gasoline engines and a full discussion of the good and bad effects of the practice will be the subject of this article. Only incidentally the preheating of the air before it reaches the carbureter, and the warming of the carbureter by means of a jacket or hot water or hot air around the vaporizing chamber is brought into the discussion.

In the monobloc type of multi-cylinder motor, with all cylinders cast in one piece, it is quite common practice to adopt a design in which the inlet ducts, or passages, for the ingoing charge, and those for the escaping exhaust gases, are all on one side of the cylinders and immediately adjacent to each other in the casting. A portion of the walls of the exhaust ducts are also a portion of the walls of the inlet ducts in some of these designs.

Some of the heat that is received from the exhaust gases by the metal forming these walls is therefore transferred to the ingoing charge of mixture just before it passes into the combustion chamber. The amount of heat that is thus transferred from the exhaust gases to the ingoing charge depends largely on the surface area of the metal wall that lies between the exhaust and inlet ducts. The heat is transferred more rapidly through a thin wall of metal than when it must pass a considerable distance through the metal. The compactness of the casting containing the ducts, which may be called the duct-box, also has to do with the rapidity of the transfer of heat from the exhaust gases to the ingoing charge. When the duct-box is very compact more heat is thus transferred than when it is of less compact form and the ducts are not so close together.

Lack of Preheating Causes Cooling, Even Frost—It is of course well known that when a carbureter without any hot-water or hot-air jacket is operated on air taken at atmospheric temperature, the carbureter becomes decidedly cool, especially just beyond the spray nozzle or other form of gasoline outlet into the air passage. In other words, the walls of the mixing chamber become very cool. The pipe connection from the carbureter to the motor also becomes cool at the end next the carbureter. In some cases the carbureter is cooled to such an extent by the vaporization of the gasoline that frost collects on the outside of it in damp weather, even at summer temperature.

In damp, cool weather it not infrequently happens that frost and ice collect in the mixing chamber so as to clog the passage and prevent the operation of the throttle valve. The cooling of the carbureter is more marked in connection with motors having several cylinders than in those having only one, since the vaporization is carried on more continuously when several cylinders are fed by one carbureter than when only one cylinder is fed.

Two methods of prevention came into use to keep the carbureter from freezing up. These have already been mentioned. Specifically, one method is to surround the mixing chamber, and sometimes also other parts of the carbureter, with a jacket of hot water, or hot air, from the motor; the other method is to heat the ingoing air before it reaches the carbureter, this preheating being accomplished by causing the air to come into contact with some warm, or hot, portion of the motor before reaching the carbureter.

It may also be noted that heating the carbureter, or preheating the air, or both together, affords a means of using what are commonly called inferior grades of liquid fuel, which are now so common; even ordinary kerosene can be used in this manner after the motor has become heated by running for some time.

After the liquid fuel has become vaporized and mingled with the air to form a combustible mixture, there is no probability that it will condense to a liquid during the operation of the motor. To condense it the mixture would have to be cooled below the temperature of the mixture when first formed, or it would have to be compressed without allowing it to become warmer on account of the heating action of compression. In the case of gasoline it would have to be compressed to a far higher compression pressure than is used in automobile motors, even if cooled by some means during compression so that its temperature would not rise above that at which the mixture left the carbureter.

All Fuel Vaporizes Close to Carbureter—The manner in which a motor operates is evidence that the gasoline, even if of low grade, vaporizes completely within a few inches of the spray nozzle of the carbureter. Even if the inlet pipe is long, so as not to have a considerable length not warmed appreciably by the heat of the motor, it is not cooled anywhere near as much at the part at some distance from the carbureter, as the latter and the portion of the pipe immediately next to the outlet of the carbureter are cooled.

If the vaporization were not completed near the carbureter it would be continued through the pipe, and the latter would be cooled very decidedly at the portion in which the vaporization continued. The fact that the inlet pipe does not become near as cold as an unjacketed carbureter when the air is not preheated is evidence that the vaporization is completed at or near the carbureter.

Naturally, the next question that arises is, does preheating a combustible mixture effect any economy of fuel or any increase of power? All of the know properties of gases and all of the known results of practice go to show that it does not.

First, as to the power developed in the cylinder of the motor. In a given motor the amount of power developed is at least approximately proportional to the weight of the charge of combustible mixture. The weight of the combustible mixture is proportional to the weight of the air in the mixture, assuming that the moisture in the air, or humidity, remains constant.

Volume Invariable, Temperature Changes—The volume of the charge taken into the cylinder is, of course, always the same for a given setting of the throttle and speed of the motor. This volume is approximately equal to the displacement of the piston per stroke. The piston is always at the same position when the inlet valve closes, at least in a motor with mechanically operated inlet valves, so that the same volume of charge is always enclosed in the cylinder at the instant the inlet valve closes. The pressure in the cylinder at this instant is always the same for the conditions just stated.

Every charge taken into the cylinder therefore has the same volume as measured in the cylinder, and the same pressure, both taken at the instant the inlet valve closes, as long as the speed of the motor and the setting of the throttle remain unchanged.

Weight of the charge varies with its temperature, since heating the mixture expands it if the pressure is kept constant. A pound of air at 62 degrees Fahrenheit and atmospheric pressure has a volume of about 13.14 cubic feet; when heated to 212 degrees, which is the temperature of boiling water in the open air, its volume is increased to about 16.9 cubic feet if the pressure is kept the same. It is therefore clear that a less weight of mixture is drawn into the motor cylinder per charge when the mixture is hot than when it is cool.

The smaller the weight of the charge, the less the amount of heat produced by its combustion. The amount of heat produced is proportional to the weight of the charge, when the proportions of air and fuel in the mixture remain constant, which is in accordance with the operation of the motor. A carbureter which operates correctly delivers a constant mixture.

Power Per Weight Proportional to Pressure Increase—The amount of power that a given weight of fuel will produce in a combustion motor when properly mixed with air and burned is approximately proportional to the increase of pressure that is caused by the heat of its burning. It has been clearly demonstrated experimentally in very recent years that the heat from a given amount of fuel will increase the pressure more when the temperature of the mixture at the instant of ignition is low than when it is high.

This is true even when the combustion is effected in a containing vessel such that the cooling effect of the walls is no greater at a high temperature than at a low temperature. This is contrary to the older theory of the action of combustion motors, and is apparently not yet fully understood by those dealing with such motors. The old theory is that the combustion of a given amount of fuel will always cause the same amount of increase of pressure whether the initial temperature is high or low, provided no heat is given up to the walls of the containing vessel. This theory has been conclusively proven to be untrue. The cooling action of the walls of the cylinder and combustion chamber is, of course, greater when the charge is hot than when it is cool. The motor does not therefore develop as much power in the cylinder, and the economy of fuel is less when the entering charge is hot than when it is cool.

Another disadvantage of heating the charge before it enters the motor cylinder is that it cannot be compressed to as high a pressure before ignition as a cooler charge can be. This is because it will ignite spontaneously at a lower compression pressure on account of its higher initial temperature. It has long been well known that efficiency of operation is increased by increasing the compression pressure within the limits of compression pressure that is practicable in automobile motors.

Advantages of light weight, fewer parts, lower cost of construction and possibly less power lost in the motor by driving its moving parts lie with the more simple motor which has a small and compact duct-box containing both inlet and exhaust ducts. These are strong points in favor of such construction. The best compromise seems to be this form of construction with water jackets enclosing the exhaust ducts as completely as possible.

The slower the speed of the engine during normal running conditions, the lesser the influence of preheating the mixture, whether this be favorable or otherwise. It is for this reason that little or nothing on this subject, so interesting to automobile owners and drivers, is to be heard among the motor-boat contingent. They talk little of it because its influence is so slight in their business or pleasure, as the case may be, as to be entirely negligible. The greater the speed of the engine, the more desirable is preheating, making it imperative for racing machines.

WESTINGHOUSE EQUIPMENT FOR ELECTRICS

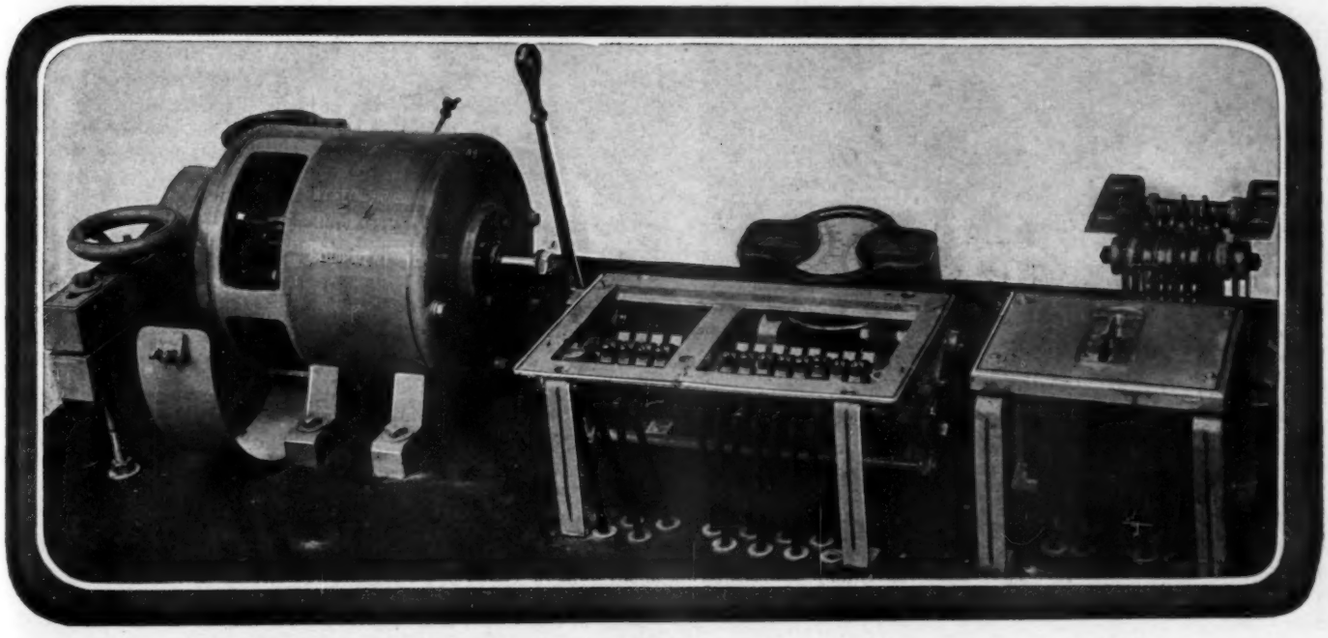
COMPLETE motive equipments for electric vehicles of all descriptions, as manufactured by the Westinghouse Electric & Mfg. Co., are illustrated by the exhibit which is making the rounds of the shows under that company's name. The illustration shows the table carrying the motor, controller and voltammeter.

The motor is of the regular vehicle type known as V-28, for 48 volts, and is very similar to the street car motors which the company has made for over a score of years. The controller, type 501-D, is equipped as in service with a grid-starting resistance, both forward and reverse notches of the quadrant being connected up. It is provided with an interlocking device, so that it is impossible to operate it incorrectly.

Current is supplied from a set of regular automobile type batteries, not shown in the photograph. The motor can be run in either direction, and loaded by means of a double prony brake, taking the place of the regular armature band brake for vehicle service. By turning one or the other hand wheel, the friction of the brake may be varied, and the current required and the voltage at which it is supplied are instantly shown on the meter.

The switch has three positions—off, running and charging—and is designed so that the key for operating it can only be inserted when in the off position, and cannot be removed until the switch has been returned to this position. This prevents any possibility of mistake either in charging or operating.

The standard vehicle voltammeter shown with the outfit permits the operator to read the voltage of the batteries at any time, determining thereby their condition and the approximate amount of charge. The current may be read when either running or charging.



Complete Westinghouse Electrical Equipment Designed for Use on Pleasure and Commercial Cars

CHARACTERISTIC CURVES OF INTERNAL COMBUSTION MOTOR

By B. D. GRAY

A COMBINATION of horsepower and torque curves with relation to angular velocity of crankshaft or piston speed, or, what is still better, total displacement per minute, will, I believe, give the most comprehensive measure of the performance of a motor and serve satisfactorily as a means of comparison.

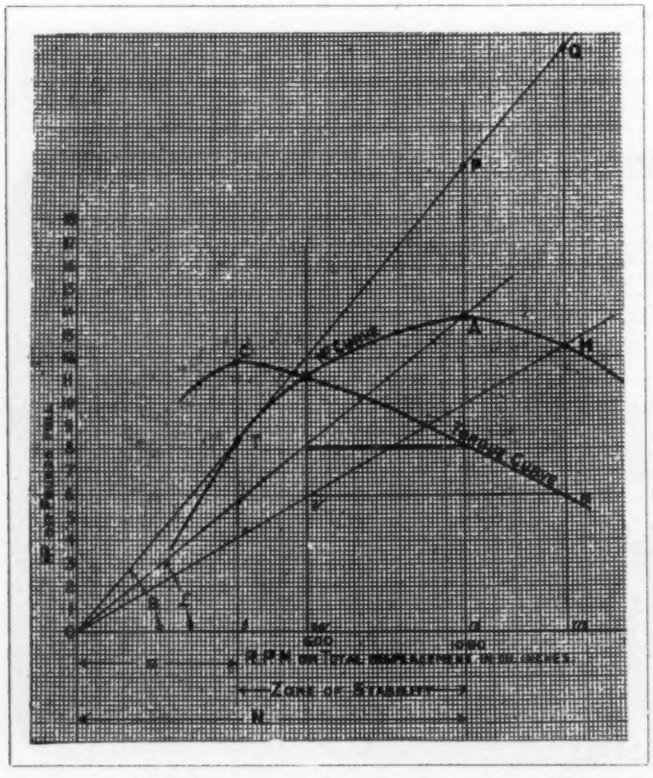
As is well understood, such considerations as type of motor, amount of compression and other details of design have no place in the discussion on this subject, although they are all important factors in the attainment of results, which it is proposed to illustrate by characteristic curves, and they enter, therefore, into the problem which confronts the designer of producing the most harmonious combination.

Mechanical efficiency has an important bearing, but I think it must also be relegated to the realm of the designer.

Thermal efficiency has, perhaps, a more intimate relationship with this subject, but it cannot properly, of itself, be made a prime factor in the determination of horsepower and torque curves.

Fuel consumption has a very decided bearing, and it may be argued that many purchasers give as much consideration to this feature as to flexibility, and that, therefore, provision should be made for a curve which would show the amount of fuel consumed, either per horsepower-hour or total, throughout the entire range of the motor. This would complicate matters, since, while it is perfectly feasible to add to the diagram given below, a third curve showing fuel consumption, it could be plotted for one condition only, viz.: Full load at varying speeds. It would be preferable, therefore, to consider separately the question of fuel consumption and efficiency.

Under present commercial conditions I believe that flexibility is the most important consideration, and desire, therefore, to direct the attention of the members to the accompanying diagram, which was published some months ago in "Omnia," in connection with a very interesting article on "Flexibility of Automobile Motors." In this diagram, both the curve of power and the curve of torque are plotted with a line representing flexibility.



Superimposed Curves of Power, Torque and Flexibility

"Graphic representation of flexibility of motor" $\frac{Pa}{Aa}$ represents flexibility of motor at normal speed N. $\frac{Qm}{Mm}$ represents flexibility at speed Om.

The H.P. and torque curves may be plotted geometrically one from the other without calculating each point. Joint point M on H.P. curve with O point. The triangle OMm gives tang. $\alpha = \frac{Mm}{Om}$.

Mm represents the H.P. at speed Om. Therefore, the quotient of the H.P. and R.P.M. equals the torque; that is, tang. α represents the torque, which is, therefore, measured on the diagram by uv. Carrying uv to the ordinates Mm the point n is obtained, representing the torque at speed Om. Note that maximum torque is obtained when α is maximum; that is, when the line Om is tangent to the H.P. curve, and the torque curve indicates that the maximum torque is at C (where the tangent is horizontal). The H.P. is maximum at A. Between n and N, corresponding to C and A, is the "zone of stability."

It is interesting to note in what way the information thus obtained regarding the performance of a motor may be utilized in determining the gear ratios of an automobile.

Gear reductions in transmission should be so designed that speed changes will keep the motor within the "stable zone," *i. e.*, as resistance increases and motor speeds decrease to n a change to the next lower gear will permit a motor speed of N without change of vehicle speed. Hence neither racing nor stalling of motor.

Flexibility of the motor is represented by $s = \frac{N}{n} \times \frac{w}{W}$.

N = the normal speed.
W = the maximum power.
n = R.P.M. which gives maximum torque.
w = power corresponding to speed giving maximum torque.

Theoretically gear reductions should be as follows:

v_1, $v_1 \times s$, $v_1 \times s \times s$, $v_1 \times s \times s \times s$, hence the reason for geometrical progression. On account of air resistance the high speeds must be less than gear reductions indicated.

Considering the H.P. curve and taking the tangent from the origin O, the right-angle triangles OPa and OTt give:

$$Pa = \text{tang } \beta$$
$$Aa = \text{tang } \alpha$$

or

$$\frac{Pa}{Aa} = \frac{\text{tang. } \beta}{\text{tang. } \alpha}$$

It is known that the tangents measure the torque and that the ratio of the torques considered represent the flexibility of the motor; hence $\frac{Pa}{Aa}$ represents the flexibility. The flexibility is always greater than unity, usually varying from 1.2 to 1.5. It should be possible to obtain a flexibility of 1.6. In actual practice the apparent flexibility is increased by racing the motor before shifting to a higher gear. This is represented on the curves by Om, representing a speed greater than N. If speed changes are made in this way s becomes $\frac{Qm}{Mm}$.

REMARKS RELATING TO GEAR AND PINION FAILURES*

By GEO. WM. SARGENT

IT IS not the purpose of this paper to go into the subject exhaustively, but merely to bring to your attention some of the points and facts which have come under my observation. If by so doing a discussion and investigation into the causes of gear and pinion failures can be started, more exhaustive developments are sure to follow, and this effort will have some merit.

Failures in general may be traced to one or more causes:

First—Improper design.

Second—Selection of material not suited to the purpose.

Third—Improperly manufactured material.

Fourth—Improper treatment of material.

Fifth—Conditions arising in service.

In this paper improper design only will be considered.

Actual faulty design is not a rarity. The matters of gear design and strength do not seem to rest upon the same safe mathematical basis as girders, beams, columns, etc., such as are used in bridge and structural engineering. Kent's Mechanical Engineer's Pocket Book refers to six elements and intimates of others entering into the construction of a formula from which the strength of the toothed wheel could be calculated. Again, according to Professor Harkness, the power transmitted by a given pair of gear wheels varied from 1 to 15, according to the various constants and formulas then extant (1886). This remark, however, refers more particularly to gear design. Having in mind efficiency for the transmission of power, but if the efficiency is lowered the power is consumed in the gear to the detriment of the latter.

Wilfred Lewis advises that in figuring the strength of a gear the tooth should be considered as a beam loaded at its extremity and supported at its base; and, furthermore, that one tooth carries the entire load distributed across its face. Right here I wish to emphasize this last. It is exceedingly important that the load be distributed across the face of the entire tooth and this is a condition which is very hard to obtain on some instances; for example, beveled pinions and gears. In these cases, even though the design of the pinion is correct, and the strength all that is necessary under correct alignment, the concentration of the entire load upon one portion of the face of the tooth of the gear, which would follow disalignment, would result in failure.

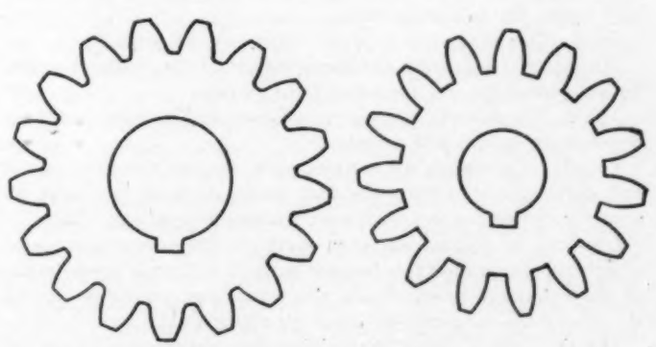
We find in "Elements of Machine Design," under the heading of "Influence of the Form of the Tooth on Its Strength," Professor Unwin remarks: "It will be seen presently that the teeth tend to break across at the root. The teeth are stronger the shorter they are, and the thicker they are at the root. They cannot to be shortened without reducing the arc of contact, and their length should be such as to ensure a sufficient, but not excessive, arc of contact. The thickness at the root depends on the form selected for the teeth. Involute teeth are generally stronger than cycloidal teeth, the teeth are stronger the smaller the diameter of the describing circle used for the flanks. In no case should the flanks be described with a rolling circle, the diameter of which is greater than half the diameter of the pitch line, inside which it is rolled."

I have already referred to Lewis' formula, in which the tooth is considered as a beam loaded at one end and supported at its base. The teeth, therefore, should not be longer than is necessary to give the desired form in order that any loss of power may be a minimum. Furthermore, with a full-sized tooth there is a strong tendency toward under-cutting, which weakens the tooth at its most critical part. Figs. 1 and 2 illustrate this point.

In automobiles, all transmission gears are subjected to a heat treatment and most spur gears are made of the hardened and tempered types of steel. In these latter the under-cut produces an effect similar to a groove or notch; for in the hardened and tempered piece it produces a temper line at the groove or notch and this temper line may develop into a plane of weakness. In pinions this under-cut condition is more likely to occur, for here the number of teeth are fewer, consequently the difficulty of forming the tooth without an under-cut is increased. A 13-toothed pinion will show more severe under-cutting than a 15 or 17-toothed pinion; and in designing pinions and gears this fact should be borne in mind, especially since the work which the pinion has to do is frequently the most severe of any part of the transmission. Again where the width of the tooth of the bevel pinion and gear at the addendum-circle is greater than at the root-circle, the effect of heat treatment is to make the overhanging end or ends harder and more brittle than the rest of the tooth; so that any extraordinary severe stress or shock is bound to cause a break at the overhanging part.

Generally speaking, all gears which are to be heat-treated should be so designed as to lend themselves to the conditions accompanying or resulting from such treatment; for instance, the sections of the various parts of the gear should be, in so far as it is possible, of uniform dimensions, so that in heating, no one part will heat faster than another, thus warping the gear. Likewise in quenching uniformity of dimensions prevents unequal cooling and hence warpage or distortion.

When it is recalled that at 700 degrees Centigrade a steel with 80,000 pounds tensile strength at the normal temperature possesses but 1,000 pounds and an elastic limit likely less than one-half this amount, it will be seen that 3 degrees difference in temperature is sufficient to produce a permanent change in the piece, and a design, therefore, which permits one part of the piece to heat or cool more rapidly than another is to be avoided as much as possible if distortion or warpage is to be reduced to a minimum. In the nature of things, this distortion of a heat-treated piece of steel cannot be eliminated, but it can be brought to the least possible amount, and should be, since warped gears are



Proper Form of Wide, Strong Gear Teeth and Improper Teeth

noisy and likely to break. When one recalls that hardened steel has little or no ability to flow when strained beyond its elastic limit, the necessity for a correctly proportioned gear is more appreciated.

Furthermore, sharp corners or edges and sharp re-entrant angles should be avoided in any heat-treated piece of steel, since such design is not only naturally a weak one, but also prone to have developed, through the treatment, temper lines which may readily become planes of weakness.

Having now called attention to some of the points involved in gear design from a metallurgical point of view—and this should be noted for there is no pretension to pose as an expert in gear design—the consideration of the remaining causes of gear failures referred to in the first part of this paper will be made at a later time, for each in itself involves so many points that it would seem best not to attempt to cover them all.

*Paper read at the semi-annual meeting of the Society of Automobile Engineers, New York City, January 4 and 14, 1910.

RECENT CLUB ACTIVITIES

QUAKER CITY'S GOOD ROAD WORK

PHILADELPHIA, Jan. 31—That there are numerous avenues of usefulness open to the up-to-date motoring organization when roads are blocked with snow was made manifest last week when the Quaker City Motor Club began the distribution of a pamphlet. This contained the constitution and by-laws of the East Whiteland Township Improvement Association and a history of how it does its work of improving roads within its particular bailiwick.

The Quakers are especially interested in this small subdivision for the reason that a number of its most prominent members have summer homes in the immediate vicinity and because the much-traveled Lancaster Pike bisects the township from east to west. The Quakers argue that if the road supervisors of other townships can be similarly interested a vast chain of road-improvement projects will be launched which will benefit not only the automobilists, but the farmers and the property owners along the improved highways.

The rusticating Quakers had long deplored the poor condition of the Pike, and President Ross and Frank Hardart, whose properties abutted on it, determined to bring about a change. They interested the road supervisors—Messrs. Morris, Templeton, and Thomas—and later the project of organizing the East Whiteland Township I. A. was put through, whose object can be summarized under the following heads:

First. The improvement of the roads and the township.

Second. To encourage the improvement of the roads in neighboring townships and throughout the county.

Third. To promote and encourage local and neighborhood improvements, public and private.

Fourth. To discuss all matters pertaining to the public good and encourage all enterprises that would increase the value of property or improve in any manner the condition of our citizens.

Upwards of $20,000 has been spent on the township's roads, and there is a comfortable balance to open the roads in the event of snow blockades—which, by the way, came in handy during the Christmas blizzard—or other emergencies.

The Q. C. M. C. is of the opinion that similar results can be obtained in other communities, and is mailing the history, constitution and by-laws of the East Whiteland T. I. A. broadcast in the hope that the seed may fall upon fertile ground and similar benefits follow.

JUST BROKE MEMBERSHIP RECORD

SYRACUSE, N. Y., Jan. 31—The Automobile Club of Syracuse succeeded in its determination to have 400 members by the end of the year, and with 5 to boot, at that. The end was almost gained in a meeting held December 22, when 25 new members were voted in, but the figure still remained a trifle short of the mark which had been set. So the officers got busy, and on Thursday of this week held another meeting when 13 more were voted in. It was a lucky number, for it completed a quota of 405 members.

This is an increase of 168 since July 1, and it represents a lot of tall hustling on the part of the officers, particularly of President H. W. Smith and Secretary Forman Wilkinson. The assistant secretary, Miss Grace Tickner, has also hustled some toward this end. The officers now say that nothing short of 100 more before July 1 will satisfy them, and they are going after the "candidates" strong. Beginning January 1 the club will issue every month a club paper, to be known as the Spark Plug. It will be the official organ of the club and will contain information to members regarding such matters as speed traps in this section, road information for short tours out of Syracuse in all directions, reports of club meetings, banquets, etc.

The membership of the club has so increased within the last year that at a recent meeting it was decided that this publication should be initiated. One object will be to keep members well posted on automobile legislation as it is introduced from time to time and the progress that is made with it.

The club is continuing its campaign for better road directions in and out of Syracuse. This week signs were sent to Elbridge, Cazenovia and Oneida Castle, at the request of residents there. There is a danger point on the State road between Camillus and Marcellus, where large signs have been placed, warning autoists to drive with care. Several accidents have occurred there, and the club was asked to send signs. There is a tunnel 200 feet long, and the road enters and leaves at an angle.

NEW HAVEN'S NOVEL BANQUET SCHEME

NEW HAVEN, CONN., Feb. 7—Novelties are promised to those who attend the second annual banquet of the New Haven Automobile Club, to be held in Harmonic Hall, that city, February 9. The banquet will have for one of its novel features the fact that it will be a speechless affair. Among other odd effects the only illumination at the dinner will be furnished by powerful auto searchlights, while the music will be furnished on an orchestral electric phonograph. The decorations will consist entirely of automobile accessories and supplies. Invitations have been sent to over 500 club members and their friends, and among those who are expected to attend are Gov. Weeks, Secretary of State Rogers, and Attorney Joseph P. Tuttle, counsel for the State Automobile Association of Connecticut.

DENVER CLUB WILL HOLD SECOND SHOW

The Denver Motor Club will hold its Second Annual Automobile Show on February 2-3-4-5-6. The Board of Governors have appointed the following on the committee: C. P. Allen, chairman; Dr. Edw. F. Dean and Wm. D. Nash, the latter president of the Denver Motor Club. Communications should be addressed to C. L. Wands, manager.

EVEN SALAMANCA HAS A CLUB

In Salamanca, N. Y., about twenty-five local automobilists met recently and organized the Salamanca Automobile Club. The following officers were elected: President, Charles R. Gibson; vice-president, George L. Hammond; secretary, Albert M. Preuner; treasurer, William H. Hazard.

ROAD BUILDING NEWS

INDIANA WILL NOW BUILD GOOD ROADS

INDIANAPOLIS, IND., Feb. 7.—Road work in Indiana, which has been stopped for more than two months, has been resumed, following a decision of the supreme court that the road laws are constitutional. In November the same court held that these same laws were unconstitutional, but, in response to a general demand, consented to reopen the case.

The laws affected are the ones providing for highway construction and the three-mile statute. Under the former, fifty or more residents of a township having a population of 30,000 or more may petition for an improvement, the question to be submitted to a vote in the township. Bonds are then issued by the county commissioners to defray the expense and later a

NEW YORK AUTO OWNERS' LICENSE ADVOCATED

ALBANY, Jan. 31—Those endeavoring to have the owners of motor vehicles examined and licensed like a professional chauffeur will have the aid of Governor Hughes, judging from his message to the Legislature on the subject, as he says therein:

There is obvious necessity for the improvement of the regulation of motor traffic. I believe that a substantial license tax should be imposed for the privilege of operating motor vehicles within the State, the proceeds to be devoted to highway repair. But the matter of first importance for your serious consideration is the provision of adequate safeguards to protect the lives of our citizens. The operation of motor vehicles should be prohibited save by those who upon proper examination and after tests specially adapted to their work are found to be duly qualified and are licensed accordingly under proper State authority administering a system of uniform application. These licenses should be subject to suspension and revocation, and in case of repeated infractions of the law the guilty person should not only forfeit his license, but be debarred from receiving another in the future. It should be made a crime in itself, with severe penalty, for any one to seek to escape after an accident to which his act has contributed.

Relative to good roads or highway improvement, all the Governor has to say to the Legislature in his annual message is this:

Important progress has been made in the construction and improvement of our highways. Of the 520 miles of roads under contract when the new State Highway Commission entered upon its work at the beginning of last year, 201 miles have been completed and accepted, and of the remaining 319 miles, 75 per cent. of the work has been done. In connection with these roads, supplemental agreements were made for construction of 112 miles of bituminous macadam, of which 88 miles have been completed.

During the past year there have been expended for the improvement of county roads $2,847,261, of which the State contributed $1,783,827 and the various counties $1,063,434. Special attention has been paid to repair and maintenance, and $941,000 were expended during the past year upon roads previously completed. Three hundred and seventy-five miles of road have been oiled with a heavy asphalt oil and covered with screenings or gravel.

The total amount available for town highway purposes during the past year, which was expended under the direction of the Commission, was $3,801,732, of which there was raised by highway tax on the towns outside of incorporated villages and cities the sum of $2,436,199, and the State contributed $1,365,533. There was also raised for bridge purposes $747,340.

MASSACHUSETTS LAW IS WORKING SATISFACTORILY

BOSTON, Jan. 31—In his inaugural address, presented to the Legislature recently, Governor Draper, of Massachusetts, says: "The automobile law which was passed by the last Legislature is working well. It is expected that it will produce a net revenue of $175,000 during the next year for use on the State highways; and, with the authority given the Highway Commission to check reckless driving of these vehicles, it is, in the opinion of the commissioners, the most effective automobile law of any State. The Highway Commissioners should be allowed to have sufficient money on hand to enable them to make advances to laborers and others for repair work. Where this work is done at present—

ROAD BUILDING NEWS

general tax is levied on the township to reimburse the county.

Under the three-mile law, an election is not necessary. Fifty or more property owners may petition for a road not to exceed three miles in length which will connect an improved road traveled by a rural mail route, at either end. A bond issue and subsequent tax is also provided under this law.

The laws were questioned in a suit brought by Samuel H. Smith against the Hamilton County Commissioners. The general law apparently reads that the township in which the work is to be done must "include" an incorporated city or town of 30,000 or less inhabitants. The court holds that the work may be done in any township in the State, and also in any city or incorporated town of less than 30,000 inhabitants.

THE LAW AND THE AUTOMOBILE

there not being money on hand to deal directly with such men—the repairs are unnecessarily expensive. They should also be given authority to buy small sections of land in different parts of the Commonwealth, to be used for the storage of their machinery; and, when opportunity offers, should have the right to purchase land in various sections which furnishes good material for road building. All these purchases of land, either for the storage of machinery or the deposit of material for repairs on roads, should not be completed without the approval of the Governor and Council. I recommend that authority be given the Highway Commission in both these directions, because I feel certain that it will save money for the Commonwealth and permit the commission to render better service."

TO ILLUME TAXICAB DIALS AT NIGHT

BOSTON, Jan. 31—Managers of the taxicab companies operating in this city are much disturbed by a new rule put out by the State Commissioner of Weights and Measures. Under a law passed last year this official was given power to examine taximeters and see that they were accurate. His first order was that they must be connected with the front and not with the back wheels; then he required that every meter be subjected to a State test as to its accuracy in recording distance and time. These were perfectly satisfactory to the taxicab managers. The latest rule, however, requiring that the dials of the meters be illuminated at night, so that the passenger can more readily tell the charge, is opposed. The managers say that they cannot afford to equip their cabs with dial-illuminating devices and continue to operate them under the taxicab rates. They say that to comply with the rule it will be necessary for them to wire the cabs, install the lights and batteries and also maintain charging stations and a large number of extra batteries. Furthermore, they believe such a rule unnecessary. Two of the smaller taxicab companies have already removed the meters from their cabs, and the larger ones are considering such a step. In case they do, taxicab travel in Boston will be much more expensive than at present, for the other schedule of charges will make the rates much higher for the same distance. The larger taxicab companies equip their drivers with pocket searchlights and require them to illuminate the dial at the end of a trip for the benefit of the passenger. They even keep inspectors on the streets at night to see that this rule is complied with. The manager of one of the large companies states that it will cost from $3,000 to $5,000 a year to comply with the lighting rule, and his company cannot afford to do it under the existing taxicab rates. The taxicab companies probably will take steps to ascertain their exact rights before the law and will combat the enforcement of the rule if they have a fair chance, rather than remove the taximeters from the cabs.

In the end this may work out to an increased rate of fare, since the taxicab company does not exist, which would not welcome the excuse that would allow of doing this very thing. So it is that legislation does not always work out in just the manner expected when it is planned. In so far as the public would really pay for all of the benefits here, it is questionable if it is worth while to make the change as proposed.

Universal demountable rim has many friends among the garage men. Scene in one garage.

GARAGES

The Hokanson Automobile Co., of Madison, Wis., general western Wisconsin representatives for the Buick, Oldsmobile, White steam and gasoline and Oakland cars, on January 26 formally opened its handsome new garage and salesroom building at 14 to 20 East Doty street. The garage is three stories high, with about 30,000 square feet of floor space. The Hokanson company was reorganized several months ago and capitalized at $70,000. Charles F. Spooner is president; Emil Hokanson, vice-president; George P. Miller, treasurer, and Rudolf Hokanson, secretary and manager.

The Baker Motor Vehicle Co. is erecting in Cleveland one of the most modern and completely equipped garages in the United States. The building is 200 by 162 feet, located on Euclid avenue, and built 50 feet back from the street. It will be occupied by the Baker Motor Vehicle Co., Cleveland salesrooms and the Standard Automobile Co., Cleveland distributors of the Packard. The Euclid avenue section will be devoted entirely to show rooms and offices, which will be finished in oak with panelled walls. Two garages, one for gasoline and one for electrics (with repair shops for each), battery department, painting and upholstering shops will be operated in connection. The garages will have a storage capacity of at least 80 electrics and 30 gasoline cars, and will have many new features.

The Taylor Motor Distributing Company, of Philadelphia, has been formed to handle the Warren-Detroit "30" in that city and vicinity. The company includes William P. Taylor, president; Frank B. Cook, vice-president, and Philip M. Price, secretary.

The Bergdoll Motor Car Company, of Philadelphia, has secured the large garage and storage plant formerly occupied by the local electric bus company, which will be immediately equipped as a factory for building the Bergdoll "30" and Bergdoll taxicabs.

The garage and salesrooms of A. Vernon Hart, Rochester, N. Y., were badly damaged by fire last Friday, and several cars were scorched and otherwise injured. The estimated loss is $10,000. Mr. Hart handles the Thomas Flyer, Oakland and Columbus Electric.

The Garage Equipment Manufacturing Company, of Milwaukee, Wis., manufacturers of motor car accessories, has been incorporated with a capital stock of $100,000. The incorporators are: George F. Discher, D. H. Discher and Theodore Kerner.

W. T. Toops, Harry Ennis and C. H. Smith, of Bowling Green, Ky., have organized the Bowling Green Automobile Company, and will do a garage and supply business as well as handling a line of automobiles.

The Gordon Motor Company, Inc., Richmond, Va., has, on account of increasing business, purchased a large lot on which it will erect a modern garage and salesroom at an estimated cost of $50,000 for the building alone, equipment extra.

The Prothers-McGinnis Auto Company, of Barboo, Wis., has arranged for the erection of a large building during the coming Spring, which will contain its garage as well as a large equipped machine shop.

The Ames Auto Garage Company, of Orrville, Ohio, has been purchased by the Champion Thresher Company. The garage will be enlarged, and R. C. Taylor has been appointed manager

B. H. Smith, of Caro, Mich., is about to erect a one-story building to be used as a garage and repair shop, in which will be handled supplies, sundries and automobile accessories.

In Cleveland, Ohio, Harry S. Moore, agent for the Stoddard-Dayton, will open a garage and salesroom on Euclid avenue, continuing his place of business on Crawford road.

William E. Kennard, in Seneca, Kan., has taken over the automobile garage formerly conducted by Thomas Bennett & Son, and will conduct the business in the future.

The Willis Motor Car Company in Syracuse, N. Y., has taken the Rapid Truck agency for Central New York. James B. Fiedler will manage the truck department.

At Denver, Col., the Studebaker Automobile Company has just moved into the new garage at 1515 Cleveland place. This is a modern two-story building, 50 by 125 feet.

STERN WHEEL TAX ORDINANCE KILLED

The Milwaukee common council committee on judiciary has effectively killed the Stern wheel tax ordinance pending for some time, by recommending indefinite postponement, which has been agreed to by the council. The measure provided for a special tax on all vehicles, including horse-drawn and self-propelled, to raise money for street improvement. The Milwaukee Automobile Club took a decided stand against the measure, and its efforts were successful. The argument of Counsel James T. Drought, of the M. A. C., was that the motor car owners are paying a fair share of taxes in their registration fee and personal property assessments; that the special tax would be double taxation, and that the measure would mean discrimination. This, it was contended was wrong and aside from the original purpose of the bill.

R. C. Hupp, president Hupp Motor Car Company.

AGENCIES

W. H. Wilcox, of Binghamton, N. Y., is handling the well-known Marmon car in the State, excepting for the three or four counties around New York City and some four or five counties in the extreme western end of the State. In addition to the Binghamton district, the Wilcox agency crosses the line into Pennsylvania, taking in two or three counties adjoining. The Wilcox agency reports a brisk demand for this well-known make of automobile, and in the rather rough going in some of the hilly country of New York State, it is claimed that the extremely powerful motors of this make in a chassis which is designed for a low center of gravity and good clearance, users are extremely well pleased and satisfied customers spread the good news everywhere.

The O. G. Roberts Co., Columbus, Ohio, which opened a sales agency and garage at 953 East Gay street a year ago, is planning the erection of a large addition to the plant as soon as the weather will permit. The concern is now the agent for Central Ohio for the Courier, made at Dayton, in addition to the Overland, the Stearns, Jackson, Marion and Stoddard-Dayton.

Rainier motor cars will be represented in Maryland by L. H. Shaab, 116 W. Mount Royal avenue, Baltimore, Md. R. M. Robinson, Albany, has closed the agency for the Rainier in that city and district. Mr. Robinson also represents the Reo and has taken on the Rainier to supply the demand for a high-class car in Central New York.

The Racine Manufacturing Company, of Racine, Wis., is now turning out a large percentage of bodies as before the fire in December. Temporary dry kilns have been erected on the site of the old plant. Every available building in Racine is being used by the company, and new machinery is arriving daily.

The Bejier & Finch Motor Car Co. has been formed at Stevens Point, Wis., to handle the Ford in Portage, Wood and Waupaca counties, Wis. H. J. Finch, of Stevens Point, and Arthur H. Bejier, of Phillips, are the proprietors.

C. A. Woodruff, purchasing agent Chalmers Motor Company.

Among the new branches established along Broadway was noted that of the Gilbert Manufacturing Co., at 2002, next to the corner of Sixty-eighth street, which store will be shared with the Seamless Rubber Co. The Gilbert line of accessories, as well as the Bowers carbureter, will be carried in stock, at all times, the tire accessories being featured.

Tom Botterill Automobile Company, Salt Lake City, Utah, Pierce-Arrow State Agents.

The Sterling car, manufactured in Elkhart, Ind., will be represented in Cleveland by the Sterling Motor Sales Company, a new company, with a capital stock of $30,000, of which J. C. Koepke is manager.

The Hollis-Rand Co., agents for the Speedwell and Pullman cars in Rochester, have opened up temporary quarters in the Triangle Building, that city, which they will occupy until April or May.

The Chalmers-Hipple Co., of Philadelphia, agents for the Chalmers and Hudson, have outgrown their present quarters, and will shortly move to a larger building at 206 North Broad street.

The Obenberger Drop Forge Company has been incorporated at Milwaukee, Wis., with a capital stock of $30,000. John Obenberger, H. W. Ladish and H. C. Fueleuer are the incorporators.

C. M. Logan, formerly with the Cleveland branch of the Olds Motor Works, has secured the agency for Pope-Hartford cars. Mr. Logan's territory includes all of Ohio except Cincinnati.

The Cole "30," according to arrangements just closed, will be handled in Chicago by the Standard Automobile Company. F. C. Bailey is the manager of the local concern.

The Kilpatrick-French Motor Car Company, of Lebanon, Ohio, has been incorporated by J. A. Kilpatrick, A. N. French, Albert French, Howard Ivins and C. Wilbur Ivins.

Ole G. Kinney, of Colfax, Wis., has been appointed agent for the Ford and Brush in the country districts in the vicinity of Colfax and Eau Claire, Wis.

The Ross Motor Company, of Superior, Wis., has secured the local agency for Overland automobiles, in addition to a number of other lines already handled.

The Way-Mitchell-Rigden Company, Cleveland, Ohio, agents for Republic tires and Stromberg carbureters, has secured the agency for Harris oils.

The Pullman Motor Car Company, of Cleveland, Ohio, was incorporated recently with a capital stock of $25,000 by F. C. Thornton and others.

W. L. Hurdle has been appointed agent in Cleveland for the Keystone "6," and will establish headquarters on Euclid avenue, near Sixty-fifth street.

The Ross Motor Co., of Superior, Wis., has been appointed district agent for the Overland, in addition to several other well-known lines.

The Welch car will be distributed in Philadelphia and adjacent territory by Manager Daniels of the Buick branch in that city, according to a recently completed arrangement.

REALM of the MAKERS

First Abbott-Detroit automobile, designed by John C. Utz. John G. Phillips plays an important part, and A. T. O'Connor is making the sales. The large new plant is producing many cars.

Not long ago the Pierce-Arrow Motor Car Company, of Buffalo, began a systematic inquiry with a view to ascertaining the ultimate destiny of all the cars which are made. One result was the bringing out of the remarkable fact that in so far as Pierce-Arrow cars are concerned, substantially 47.5 per cent. of the cars are absorbed by Pierce-Arrow owners. The experts who undertook this investigation expressed the further belief that a man almost always buys a low-priced car at first, and as he gains experience buys one of a higher grade. The tabulation which was made showed that 16.9 per cent. represented the class of people who purchased a car for the first time.

The Royal Tourist is out with a torpedo body which, in addition to being of excellent appearance, has been designed most carefully, according to the reports which emanate from the Tourist engineering office, and H. H. Adams, sales manager from the factory, is kept on the go because of the interest which is taken in this type of car by real buyers. The Chicago office of the Royal Tourist Car Company is 1253 Michigan avenue, where the overflow of the Tourist's friends aggregate when the Tourist booth will hold no more.

The new Torpedo Runabout which is offered in the 1910 Winton product, is attracting considerable favorable comment, which, together with the Winton torpedo type of touring car, completes the advance list, excepting that the really latest idea from this well-known Cleveland plant is embodied in a limousine.

"Report of service by owners of Franklin 1910 automobiles" is a brochure of nice proportions and clean print which is being sent out by the Franklin company, and it tells its own story. It is free for the asking. A little reminder appears on the title page which is very suggestive, i. e., "The man who can best judge the merit of an article is the man who daily uses it."

A Stoddard-Dayton delivery wagon which was built for Fleishman, the florist, Chicago, is attracting notice because of the fanciful art appearance of the body, and the fact that it is giving good service.

The Mitchell Motor Car Company, Racine, Wis., is declining to accept deposits for future deliveries from its agents. James W. Gilson, sales manager of the company, is stout in his defense of this policy, and he points out that if the Mitchell Company was to accept the customary deposit on its output of 6,000 cars the Company would have the use of $300,000 for upwards of a year, for which it would give no adequate return. The Mitchell car, by the way, was one of the sights of the Brussels Show. The consignment to this show comprised a polished chassis, a five-passenger touring car, fully equipped; a seven-passenger machine, and a roadster.

At the big plant of the Nordyke & Marmon Company, Indianapolis, Ind., work is progressing favorably, despite the fact that the deliveries are still well behind orders. In the meantime the company is preparing for its 1910 aggressive racing policy, claiming that racing has had a marked influence on the quality of Marmon cars.

. The Inter-State Automobile Company put out a booklet during the holding of the New York Show entitled, "Why We Named the Inter-State the Bull Dog." It was a neat undertaking, and the demand for the first edition far exceeded the supply. The company has issued a second edition, which is being handed out at Chicago. It is worth sending for, and autoists who are not in a position to visit the show have but to make a direct request to the company at Muncie, Ind., to get a copy.

In the Moon plant at St. Louis, much valuable time is saved through the use of a two-track shipping platform from which two freight cars can be loaded simultaneously. The tracks are so arranged that a big end-door automobile car can be switched close to the platform while a side-door car is already in position on another track.

The Dixie Motor Car Company, of Frederick, Okla., which was recently incorporated for $250,000, is designing an automobile, the price of which will probably be fixed even as low as $1,050. It is the expectation of this company that it will furnish 500 automobiles this year.

The Cole Motor Car Company entered a "30" at the late Indiana meet, and the after results seems to have proven very conclusively the futility of accepting advanced information in relation to the car ahead or the time taken by any given car. In this case, as it would seem, Endicott, who drove the Cole "30," was told that his time was 19 min. 47 sec. for 20 miles. This record was confirmed, unofficially, the night of the race, and the Henderson Motor Sales Company, which distributes Cole automobiles, wired its branches throughout the country, stating the facts as it believed.

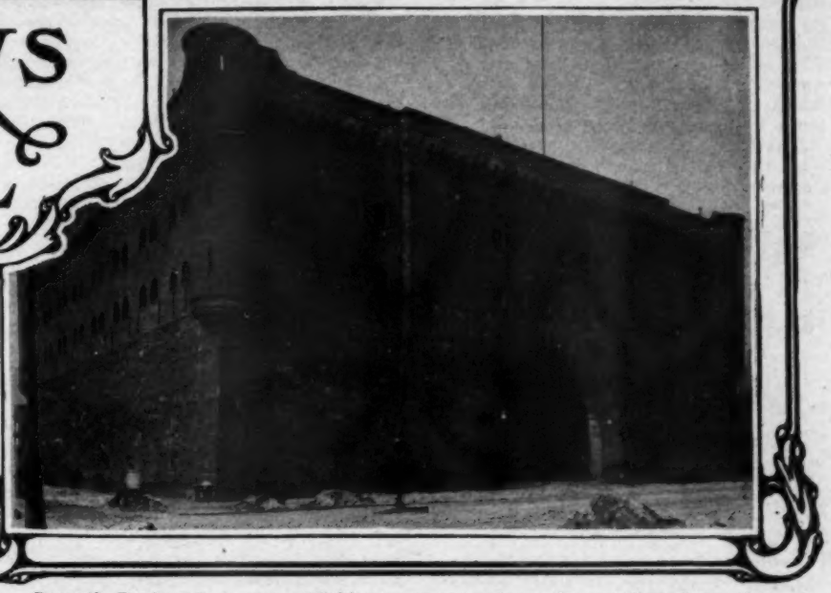
Charles P. Henderson, of the company, having discovered by reading THE AUTOMOBILE that the unofficial time as reported to him was not in accord with the official time, said: "We were amazed when we saw the time published in your journal as 21 min. 22 sec. for 20 miles. We immediately took the matter up with Mr. Warner, who wired us that the time published by your journal was the correct official time for the Cole "30."

Mr. Henderson shows that he believed the first report to be true, and the prompt action which he took, after he read THE AUTOMOBILE and found what was the true time, would seem to make his position perfectly clear.

Hugh N. Harding, the racing driver, who will be remembered as a headliner in drivers of the events of the past six years, has been retained by the Alco, and under the tutorage of B. D. Gray, chief engineer of the company, will undertake important technical investigation for the company. Those who are in a position to know fully appreciate the high technical skill of Mr. Harding—driving with him is a pastime.

Benjamin Briscoe, president and general manager of the Maxwell-Briscoe Motor Company.

News in General



Seventh Regiment Armory, Michigan avenue, where the overflow from the Chicago Show is housed. Connection is through a covered passageway at the back, and along an alleyway eight feet wide.

Chas. Y. Knight has completed a visit to certain of the automobile plants in this country, and left for his English home at "Broadwater," Kenilworth Road, Coventry, Tuesday, February 8, where he will remain for a time sufficient to enable him to complete some motor designs which are projected, after which the Knight motor situation, in connection with the Panhard & Levassor Company, will command his attention. Mr. Knight relates some very interesting phases of the motor situation abroad, and silences the story which has been going the rounds as a side light, to the effect that the Mercedes Company, at Unterturckheim, was running ahead of the original idea and taking out patents which will afford an advantage. It seems that under the terms of the license which is given force between the Knight syndicate and the respective companies, they will not have the right to export automobiles from one to the other country without giving the builders in the relating country full right to adopt and use any special devices which may be found on Knight motors as by them applied.

The Hess-Bright Mfg. Company (H.B.-D.W.F. ball bearings) cordially invites visitors to the Chicago automobile show to call at its recently opened store at 1800 Michigan avenue, where the full line of ball-bearing products of this company are artistically displayed. An accurate and convenient slide rule will be given to each engineer who leaves his name.

In Columbus Director of Safety McCune has issued orders for all violators of the State law to be arrested after February 10, the date set for enforcing the licensing of horse-drawn vehicles.

Herr Hulmle, head of the German ignition firm, U. & H., makers of the U. & H. magneto.

A recent test given the Morgan & Wright Nobby Tread non-skid tire, in Detroit, proved its excellence in the most pronounced way. The test was held on a sharp rise, one studiously avoided by motorists on slippery days. On this occasion the hill was covered with a glare of ice covered with light snow. A Buick car, equipped with these tires, was driven to the foot of the hill, brought to a dead stop, and then started, making the incline without the slightest halt or slip, even under these most unfavorable conditions.

At the second quarterly conference of the branch managers of the Franklin Automobile Co., held in Syracuse, the following representatives were present: W. S. Jewell, New York; A. B. Henley, Boston; George Ostendorf, Buffalo; F. L. Thomas, Chicago; C. H. Rockwell, Cleveland; W. F. Reynolds, Pittsburg; F. H. Sanders, Rochester; J. F. McLean, San Francisco; W. E. Brearley, St. Louis; N. S. Lee, Albany, and George E. Messer, Syracuse. T. R. Lippard and G. D. Babcock, of the Franklin Manufacturing Co., made the opening addresses.

Charles W. Oathout, of New York City, who is Eastern sales manager of the Jackson Automobile Company, is authority for the statement that as far back as 1907 it was proven by a close inspection of the records that $70,000,000 was spent yearly in the upkeep of 49,000 automobiles, which he states were then in operation in the State of New York alone. According to the same authority, this repair account mounted up to nearly $90,000,000 in 1908, and $7,000,000 more must be added to cover the increase for 1909.

The National Sales Corporation has issued for the trade a combination electrotype sheet of their automobile accessories. This pamphlet is so arranged that the descriptions may be cut out and pasted into the dummy of any catalogue.

Strict orders have been issued to the police departments of Dayton and Cincinnati to enforce the State automobile law after February 1. It is reported that many owners are operating cars without the 1910 number plates, and after the first of the month all will be arrested and prosecuted.

The B. F. Goodrich Company, of Akron, Ohio, at its annual stockholders' meeting, approved plans for extensive additions and betterments to the plant. While no direct statement was made, it was intimated that about $1,000,000 will be spent during the coming year. The meeting marked the retirement of Walter A. Folger, treasurer of the corporation. He was succeeded by W. A. Means, who has been assistant treasurer. Secretary C. B. Raymond was elected to the additional office of assistant treasurer. The other officers are: B. G. Work, president; F. H. Mason, first vice-president; H. E. Raymond, second vice-president, and E. C. Shaw, general manager.

The Mitchell-Lewis Motor Co., of Racine, Wis., the new $10,000,000 corporation at Racine, Wis., has established a large dining-room in the new general office building, where employes may obtain meals at cost.

At this early date Pennsylvania registrations have reached the 10,000 mark for the year 1910. The majority of cars registered are above twenty horse power. It is expected that the total for the year will aggregate between 35,000 and 40,000 registrations.

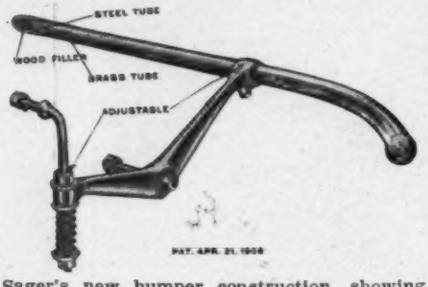
CHANGE OF NAME—YORK MOTOR CAR CO.

In accordance with its progressive policy, and also due to the fact that the company has outgrown its local name, the York Motor Car Company, of York, Pa., recently applied to the courts for a change of name, which has been granted, and, commencing Feb. 1, 1910, the company will be known as the Pullman Motor Car Company, Inc.

The demand for Pullman automobiles has grown so rapidly that the company is very much behind in its orders, but with the completion of an additional plant at Evansville, Ind., in the early summer, the output will be greatly increased, and the company will be prepared for this demand.

The officers and personnel of the new company remain unchanged. The change, as previously stated, is made so as to harmonize more with the character of its output, and to avoid the confusion which would necessarily result after the establishment of the plant at Evansville, Ind.

The Sager Bumper—The construction of a bumper capable of protecting the lamps and radiator of a heavy automobile running at high speed is not such an easy matter as one might casually suppose. The bumper in question, although it is not claimed that it will protect the car from damage in the event of its running into a stone wall at sixty miles an hour, is nevertheless substantial enough to afford a very material protection to those delicate parts



Sager's new bumper construction, showing adjustment at front end.

of the automobile which of necessity, it seems, must always be placed at its front end.

The cross bar, which receives most of the hard knocks in service, is a triple construction of an unusual and meritorious sort. The body of the bar is a stout steel tube; this is reinforced by a round bar of wood driven solidly into place. The whole is then, for appearance sake, driven into a second tube of brass. The cross bar thus formed has remarkable strength, and at the same time keeps its appearance well, not being easily bent or dented.

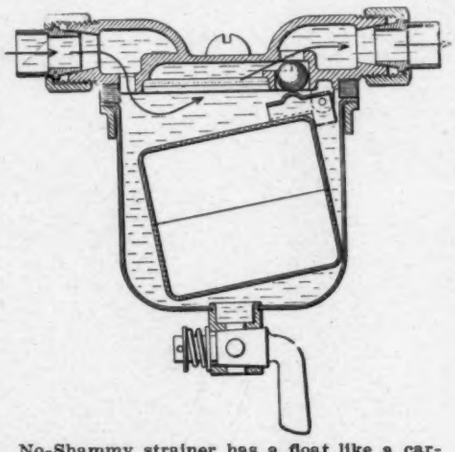
Considerable stress is laid on the construction of this bar, because it is quite important for the popularity of the device that it should retain its good looks. Accidents in which the bumper is involved are by no means necessarily the fault of the owner of the car, and he naturally does not like to have it look battered and worn.

The bar is supported on two brackets cast of manganese bronze, of I-section. These are provided with steel pivot bolts, and at their rear ends are cushioned by steel coil springs. The springs are of steel rods which pass through eyes in the ends of the brackets, being held between the brackets and nuts on the ends of the rods, so that they are in compression whenever the bumper bar is forced back. Stop-nuts are provided above the brackets, by means of which the position of the bumper bar can be regulated. The firm of J. H. Sager & Co., of Rochester, N. Y., which also makes the Sager spring shock absorbers, is marketing this improved bumper.

H. W. Nuckols, General Manager Columbia Motor Car Company.

"No-Shammy" Gasoline Strainer—Gasoline strainers usually will not separate any more water than they can hold, which at best is but two or three teaspoonsful; when water still continues to come to the trap it passes through as easily as the gasoline, and enters the carbureter. The feature of the "No-Shammy" strainer is that it automatically closes when water beyond its capacity reaches it, and so prevents any water getting into the pipe between the strainer and the carbureter.

The strainer contains a float, which is so adjusted as to sink in gasoline, but float in water. As long as nothing but gasoline passes through, the float is inoperative; but when the strainer pocket gets full of water the float rises and cuts off the feed of gasoline. This, of course, stops the motor, and so calls the driver's attention. After the water has been let out at the petcock, the float valve opens



No-Shammy strainer has a float like a carbureter, and convenient drain cock.

and admits pure gasoline to the carbureter. The motor will then start on the first turn of the crank.

The "No-Shammy" strainer is made to fit all sizes of piping, from 3-16 to 1-2 inches outside diameter. It has been adopted as regular on six 1910 cars.

Hart Gas Lamp Ignitor—This device is unique among similar ones in that it makes use of the regular high-tension ignition system of the car to effect the lighting of the headlights, instead of providing a coil of its own. It is connected with one of the coil units or with one terminal of the magneto, according to conditions. The use of the ignitor thus sidetracks the current from one cylinder momentarily; turning the switch to light the lamps causes one or two misses of the cylinder which should have received the "juice," but as a single spark does the work on the headlight the skip is hardly perceptible.

The ignitor can be applied to any car in a few minutes. One cable leads to each light, the return being grounded. A three-pole switch is provided for the dash

PROMINENT ACCESSORIES

by which it is operated. The sparking points which are applied to the acetylene jet are exactly the same in principle as a spark plug. As they spark in the open air, instead of under compression, when their switch is on and the high-tension current is given its choice of the spark-plug route or the ignitor, it takes the ignitor every time. As the device needs no batteries or other source of current distinct from that of the regular ignition system, and likewise needs no separate coil, the maker, H. T. Hart, of Hartford, Conn., is enabled to sell it at a low price.

The Wohlfeld Tire Trunk—To redeem the space within the spare tires usually carried on a tour it has become quite general to provide a circular trunk to fit inside of them. With the large tires which are coming into general use, the space available for such trunks has increased, until now a considerable amount of luggage can safely be carried in that way. The only objection urged against these trunks has been that all were not as strictly waterproof as might be desired.

With the view of making such a trunk which would be waterproof in the most severe storm, S. Wohlfeld & Company, of Philadelphia, got out an entirely new idea in the way of providing the necessary opening. The outer end of this trunk is, as usual, divided horizontally across the middle; but instead of being hinged on this dividing line, the upper and lower parts are joined by a single central pivot. This allows the upper half to slide down over the lower half to open the trunk. The waterproof feature is accomplished by having the upper half overlap the lower considerably when in the closed position, and at the same time the cylindrical body of the trunk has a lip which overlaps the edge of the upper section. Substantial locks are provided, and it is claimed that the trunk is absolutely water and dust-proof.

Wohlfeld waterproof tire trunk shown closed, with solid and reliable locks.

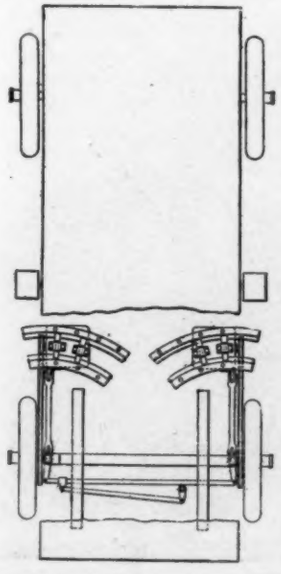
PATENTS AND PROCESSES

INVENTIONS and inventors have always had a peculiar fascination for American people, whether due to a natural inventive genius inherent in all of us, or to a receptive attitude towards things new, better and different, is hard to say. Nevertheless, this feeling exists, and in no small degree, either. To care for this, in part at least, THE AUTOMOBILE proposes to set aside one page each week for matter relative to both inventions and inventors. It will be the idea to have a competent authority deal with these subjects, so that the matter may present something of worth and the space not be wasted.

For the present week the portrait of Thomas A. Edison is presented. Mr. Edison is without a doubt one of America's foremost inventors, in which chosen field he has shown a touch of rare versatility, his inventions being of many kinds, touching as they have things electrical, mechanical, chemical, electrochemical, and pertaining to other branches of science.

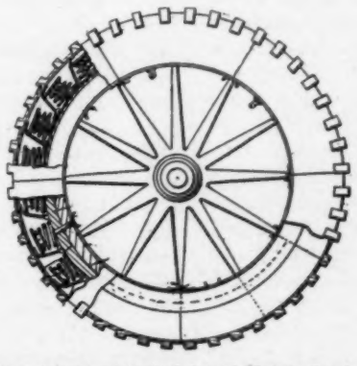
While not the purpose to expand upon any one man's inventions, and thus exploit him, as it were, it will serve as complete proof of the man's ability as an inventor to mention his work in storage batteries, his phonograph, his magnetic low-grade iron ore separator, his more recent work in connection with photography, and in particular with moving pictures, to say nothing of his work in cement, including as it does an attempt to construct a complete house at a price within the means of every working man, which house will have all of the many advantages of concrete construction.

From the latest information, it would appear as if he has now turned to automobile construction, probably drawn thereto by his work in this connection on storage batteries. As shown by the latest patent office gazette, namely, the issue of February 1, a patent has been granted him on what appears to be a development of the forecarriage idea. This is to drive the front wheels, utilizing them for steering as well. In this way the whole power and transmission unit becomes one unit, which is readily removable as a whole. In the present invention, illustrated elsewhere on this page, no mention is made of the motive power, the claim speaking broadly of a motor. The latter is mounted upon a forward truck, in such a manner as to turn with it. A further proviso is made of radial ways or tracks upon which the weight of the motor may be supported during the turning process. Although worked out in somewhat different form, this same construction was used abroad in the Italian forecarriage, Cantano, and has been very successful. This, by way of passing mention, was electrically driven from storage batteries.



Edison's fore-carriage system, using the front wheels for driving and steering.

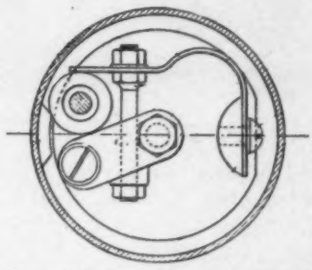
Like the non-refillable bottle, the spring wheel is a sort of hardy perennial, a new inventor with a brand-new solution of the tire problem, worked out as a spring wheel, cropping up every little while. This is not said in a sense of disparagement, but rather as comment upon the number and variety of the spring wheel inventions. In the latest gazette a patent is described which has just been granted to Rudolph J. Lackner, of New York City, the exact official designation being a spring tire. In this tire Mr. Lackner utilizes the usual felloe, upon which a series of small coil springs are mounted. At their outer ends these springs carry rubber caps, while tongues are interposed between the springs and connected at the inner ends to the felloe, have their outer ends angularly disposed, and so arranged as to press inwardly against the ends of the rubber caps. This forms a combination of wheel and tire which has, among many other virtues, that of the rubber caps being readily removed for inspection, adjustment or repair.



Spring wheel patented by Rudolph Lackner, using a multiplicity of coil springs.

Probably no one distinct part of the automobile has excited more attention at the hands of inventors in the past two years than the ignition system and its many details. As exemplifying one of the well-worked-out smaller details, the third patent reproduced this week is that of a German magneto man, Hermann Ruthardt, of Stuttgart. This gentleman is the inventor and manufacturer of the Ruthardt magneto, to which the Herz (American) magneto bears some resemblance. Herr Ruthardt's invention, as described in the gazette, is a rotary current-breaker. This breaker is equipped with a spring on unusual and noticeable shape, this being comparable to a combination of two letter U's, one inverted and the other flattened out. On this flat part is carried the platinum point, which is of unusual size. The outer end of the flattened part is the portion upon which the circular but eccentric cam operates to cause the break. The housing forms a sort of circular box, which is rotated bodily to advance or retard the time of the spark.

At least one prominent automobile company is represented in the gazette as assignee, that one being the American Locomotive Company, to which Budd D. Gray assigns his patent on the rear axle construction now used on the Alco cars. The specifications call for a central annular body adapted for the reception of driving mechanism, tubular supporting members continuous with and oppositely projecting from said central body, a spacer fixed in the central body, and tubular liners fixed in the tubular supporting members and abutting at their inner ends against the spacer.



Circuit-breaker for magneto use, embodying a number of refinements of merit.

Further claims cover the method of securing the tubular liners, intended to carry the wheel bearings of the full floating axle, in the projecting supports on the central body. One method is to shrink a band over the end of the supporting tube, thereby clamping it against the tubular liner.

Still another claim is for a construction in which the spacer and the axle tubes are assembled first, and then covered by a central body made of pressed steel in two halves, the halves being then welded together, uniting this body with the tubes.

This axle construction seems one of the neatest at present in use. It was originated for the Alco taxicab and light town car, but its success was such that this year it is to be used exclusively on all the models of this company, including the four-cylinder 40-horsepower and the six-cylinder 60-horsepower, which formerly had chain drive.

Thomas Alva Edison, who has turned to automobile improvements recently.

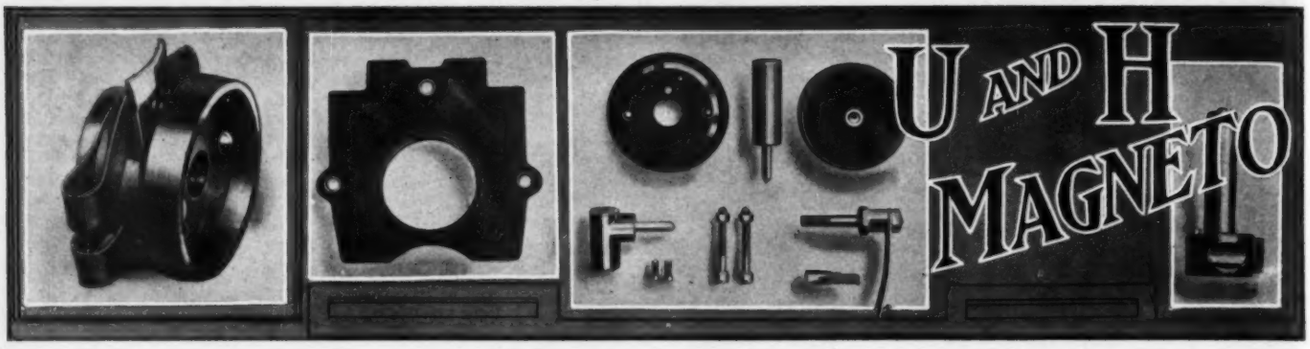


Fig. 1—Parts of magnetos, which are made to standard, in order that the rapid supply of repairs will be facilitated

THIS magneto has a double winding on its armature and is of the true high-tension type. It is made in the several styles as required in ignition work, has been before the automobile public for several years, and has earned a reputation for uniform stability. The product is made by Unterberg & Helmle, Durlach, Germany, and is distributed in the United States by J. S. Bretz Company, New York City.

Of the several types of U & H magnetos which are made, reference will be here made to two; they being enough to support the points which it is the desire to make. Fig. 1 (the title illustration) shows something of the work of standardization; parts are kept in stock at all branches of the maker, in quantity sufficient to satisfy every emergency. The part on the left, in Fig. 1, is the interrupter, which is common to all the types of this company, and, considering the great importance of this particular part in a magneto, it is well to examine it closely with a view to noting its ability.

The interrupter comprises a bronze barrel to one end of which is riveted a steel centering disc. This disc is recessed, and fits over a corresponding projection on the condenser casing, thereby locating the interrupter in true concentric relation when it is mounted into position; skill is not necessary in the process. In assembling, the flexible phosphor bronze member is interposed, and the success of the interrupter is due to this shape.

PROPER SPEED OF ROTATION OF U & H MAGNETOS

The speed of rotation of a magneto of this character bears a definite relation to the speed of rotation of the crankshaft of the motor, and to the number of cylinders of the motor, assuming that there is one spark plug in each cylinder of the motor—referring, of course, to four-cycle types of motors. For the several motors the speeds should be as follows:

Considering 4-Cycle Work

(A) 3-cylinder motors—the magneto armature must be run at 3-4 of crankshaft speed.

(B) 4-cylinder motors—the magneto armature must run at the crankshaft speed.

(C) 6-cylinder motors—the magneto armature must run at 1 1-2 times the crankshaft speed.

(D) 8-cylinder motors—the magneto armature must run at double the crankshaft speed.

Considering 2-Cycle Motors

(E) 2-cylinder motors—the magneto must run at the speed of the crankshaft.

(F) 3-cylinder motors—the magneto must run at 1 1-2 times the crankshaft speed.

(G) 4-cylinder motors—the magento must run at double the crankshaft speed.

The direction of rotation of the magneto armature is fixed when the magnetos are assembled in the shop of the maker. A small arrow printed in the metal at the driving spindle end, shows the intended direction of rotation, but by altering the relative position of the interrupter the direction of rotation will be reversed, considering the proper working of the magneto—no mechanical damage will follow if the magneto armature is rotated in either direction; the only point to be remembered is that the spark will not be properly timed unless the connections are properly made for the right direction of rotation.

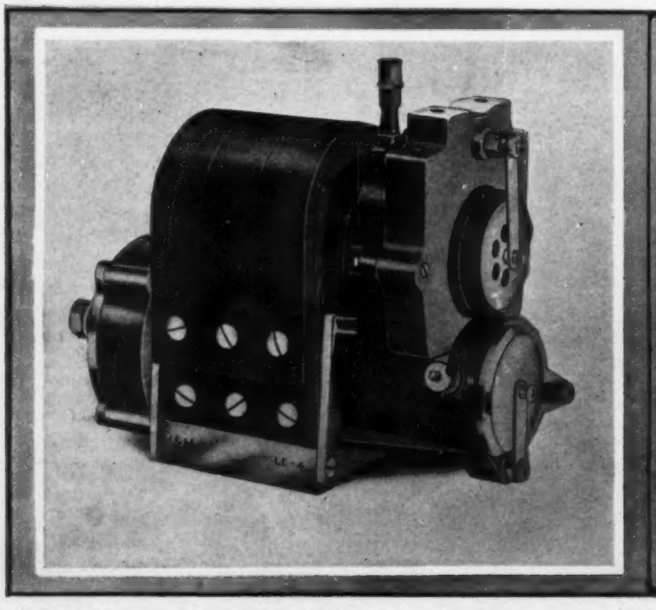


Fig. 2—Type L E 4 magneto, which is made for motors up to eight cylinders, and with a device for starting from the seat

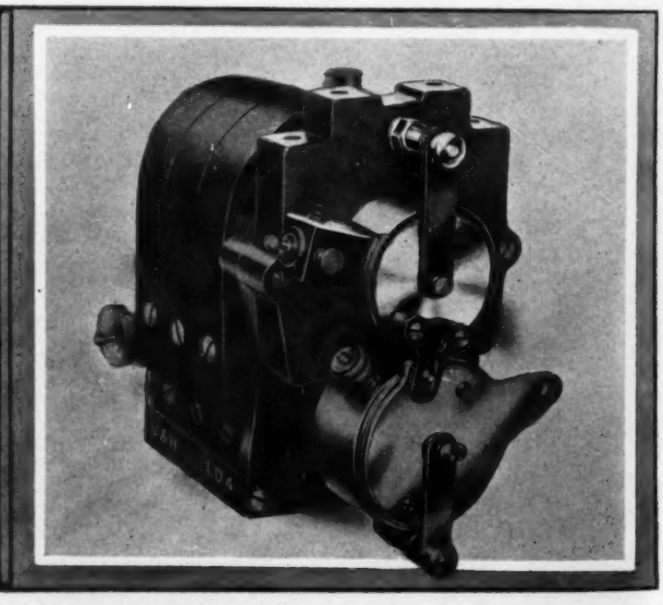
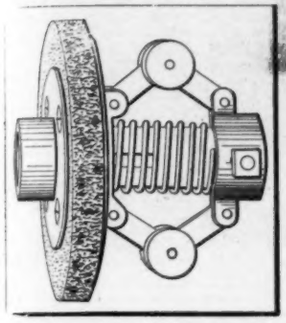
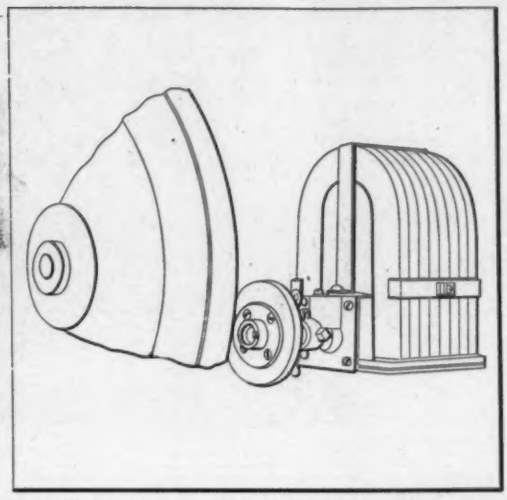


Fig. 3—Type L D 4 magneto, as made for any number of cylinders up to eight, is also intended for dual work

THE HOLTZER-CABOT IGNITION SYSTEM





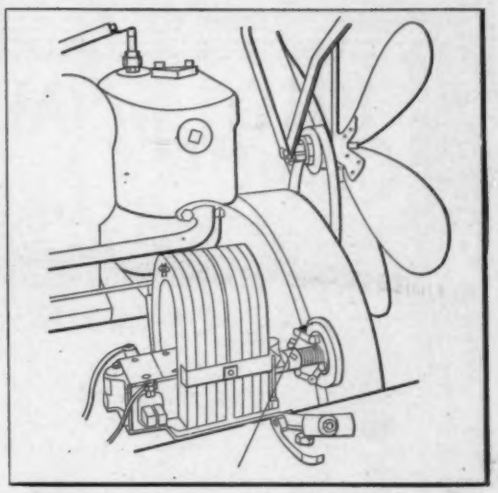


Fig. 1—Presenting details of end friction governor. Fig. 2—Showing method of applying end friction governor. Fig. 3—Type J. S. magneto, as attached to a Stevens-Duryea car.

IGNITION devices, as made by this company, are so contrived that, by means of a pulley drive, the magneto, in any given application, may be quickly and cheaply made to fit any existing automobile, thus doing away with the battery, or reducing it to a position of secondary importance. Many autoists, having failed to keep the battery system up to an efficient state, or, preferring to make a greater initial investment in the interest of diminished attention later on, employ this system. From the point of view of the makers of automobiles, it is equally available, and, in view of its ease of application coupled with a certain reliability, it is being taken up and used to an extent which is particularly noticeable.

With a view to presenting the system in its most simple form, advantage is taken of illustrations, in which Fig. 1 is of the J. S. type of magneto, as it was applied to a Stevens-Duryea car; Fig. 2 is an application of the magneto using a friction governor, and Fig. 3 shows the details of a governor, of which the maker has several designs, each one of which has a place in this class of work. Fig. 4 depicts the method of wiring which will afford the desired result considering a 4-cylinder, 4-cycle motor, and Fig. 5 presents the method of wiring when a jack-knife switch is interposed for the purpose of changing the polarity of the current, which is advantageous.

It is the claim of the maker that cork is the best material to use as the friction member in the pulley system, and this material is adapted as the standard. Fig. 2, which is the end-friction governor, is designed to keep the speed of the armature constant so that the voltage of the armature is substantially constant, although the speed of the crankshaft of the motor may change, as it does in service, over broad ranges. Besides this end-friction governor, there is a bevel type, and what is known as the "standard" type as well. The standard type of friction governor is provided with a flat-faced pulley, and contacts with the face of the flywheel of the motor. The proportion, that is to say, the diameter of the friction pulley as it relates to the diameter of the flywheel, must be considered in making an application, and, if the motor speed is a variable, as it is in automobile work, this fact must be taken into account. In ordering, if the purchaser will give the desired data, the maker will fix all the dimensions, and when the magneto is then placed, it will work without further adjustment.

FACTS IN RELATION TO THE DESIGN OF THE MAGNETO

The permanent magnets are of circular section, made of a special grade of magnet steel in which retentivity is realized to a maximum, and the strength of the magnetic field is high enough to assure the desired result. The armature is of the slotted type; windings are imbedded, and insulation is adequate for every emergency—the insulation is thoroughly protected by the slots. The armature spindle is of relatively great rigidity; it is 1-2-inch in diameter, and the bearings, which are of phosphor bronze, are allowed a sufficient projected area to last for a sufficiently long period of time to eliminate trouble from this quarter to a noticeable degree.

Lubrication is by means of a grease cup, involving the application of a steel ball which rides on the shaft and pinches off the supply of lubricant by resting on the seat of the cup. A dual system of brushes, which represent an unusual feature in magneto work, assures that at least one set of brushes will be in good electrical contact, unless it transpires that the care given the magneto takes on a characteristic which may better go by the name of positive and long-continued neglect.

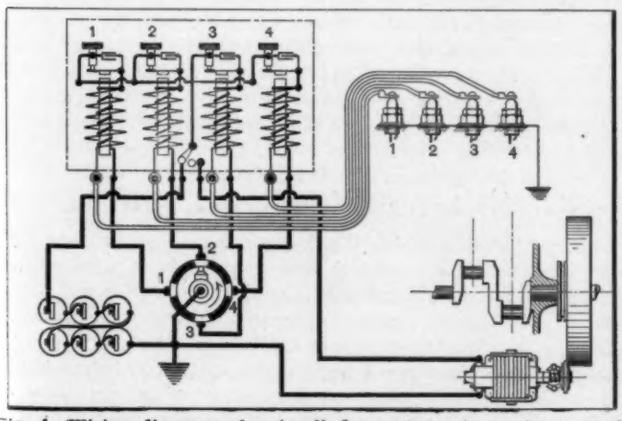


Fig. 4—Wiring diagram of a 4-cylinder motor using a jump-spark system

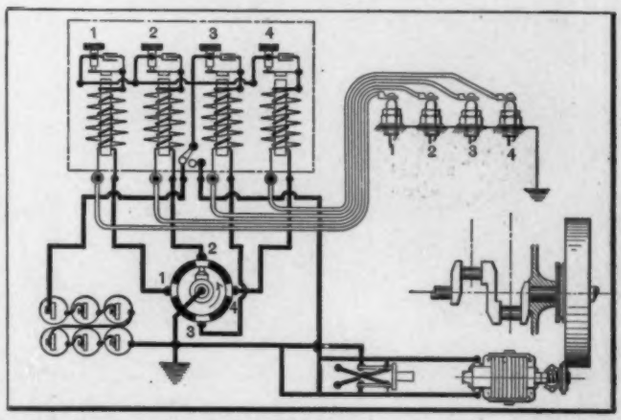
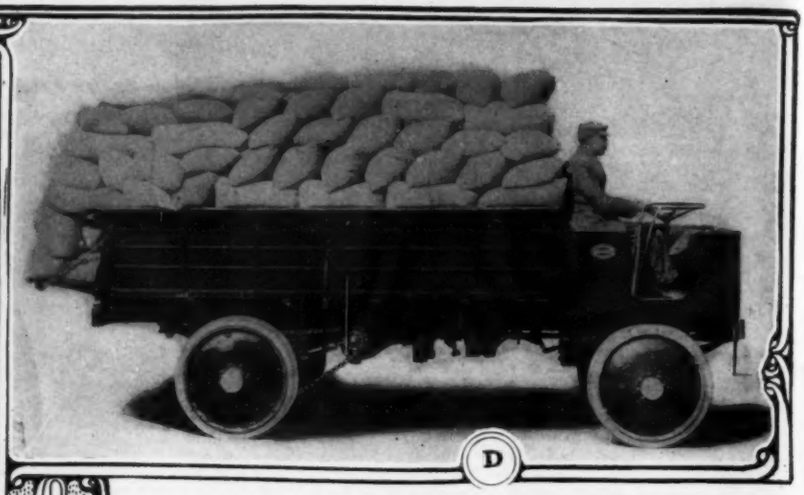


Fig. 5—Four-cylinder wiring diagram, with a polarity-changing switch

1910 COMMERCIAL

A



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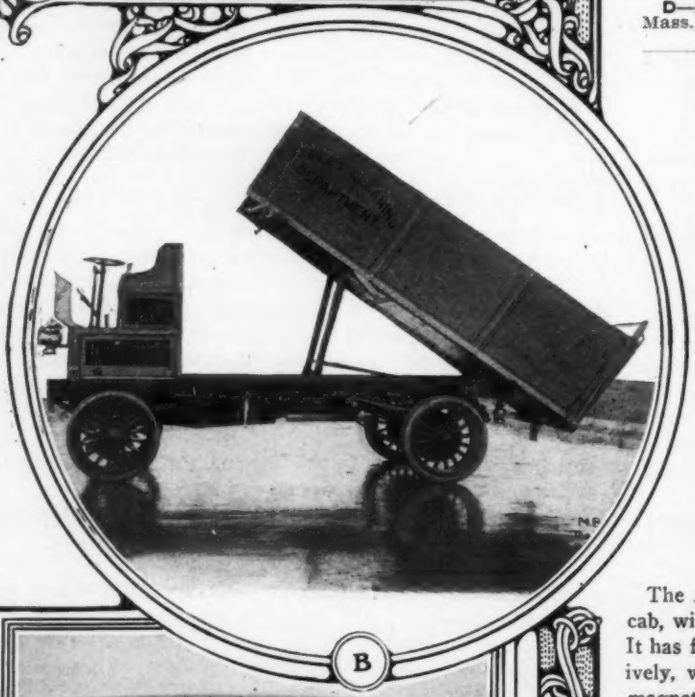

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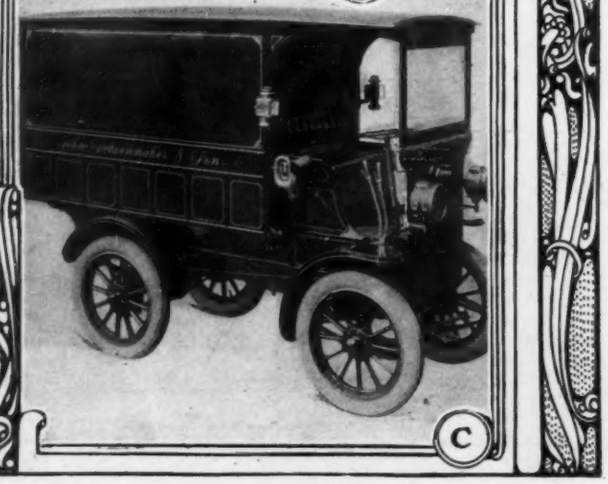


C

A—Hewitt Motor Company's 2-ton delivery wagon, used by Colgate & Company in the delivery of soap.

B—A Manhattan truck fitted out with a tilting body of steel, for use in the Street Cleaning Department. The body is shown tilted to the dumping position.

C—Franklin delivery wagon as used in Newburgh, N. Y., by John Schoonmaker & Son.

D—A big truck made by R. L. Morgan Company, of Worcester, Mass., with a load of cement in bags.

COMMERCIALS, as they are exhibited at Chicago, include eight forms of strictly business wagons and one taxicab, the latter being a Thomas. The commercial situation is better represented in the tables as published in THE AUTOMOBILE, issue of February 3, which includes 45 makes, including taxicabs. This branch of the automobile industry is rapidly assuming the importance it is entitled to, and it is predicted by those who have followed the commercial situation closely that it is now but a matter of little further experience on the part of users when they will be convinced of the desirability of utilizing commercial vehicles to the entire exclusion of animal-drawn wagons. A few of the types of cars which are now in common use in commercial pursuits are here illustrated, they having been taken at random with the expectation of showing to what extent the commercial situation is spreading out, rather than to confine them to just the types of power wagons which are on parade at the show.

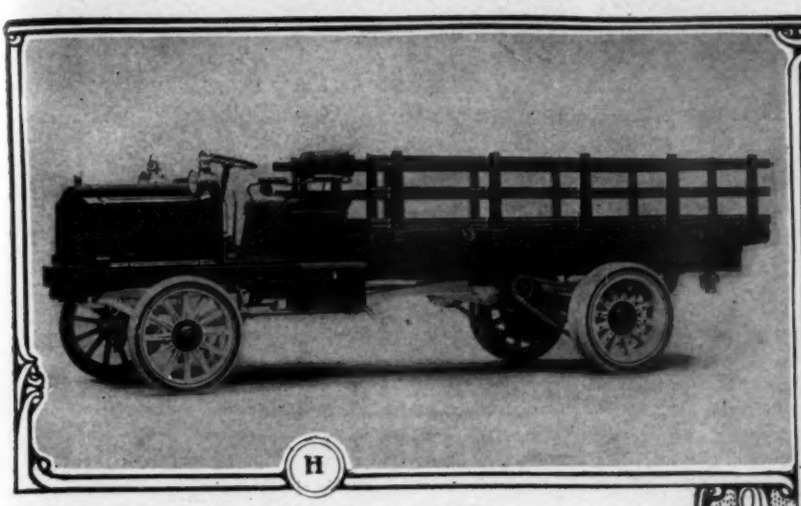
AMERICAN LOCOMOTIVE CO. PRESENTS THE ALCO

The Alco, in a commercial sense, is available as a model 16 taxicab, with a 24.8-horsepower motor, taking the A. L. A. M. rating. It has four cylinders, 100 by 120 millimeters bore and stroke, respectively, with a cellular type radiator, centrifugal water pump, Bosch magneto without auxiliaries, four-feed lubricating system, multiple disc clutch and three-speed selective transmission gear with reverse. The wheel base is 104 inches, with a 55 1-8-inch tread. Bearings are anti-friction, excepting in crankshaft, and the tires are all 32 by 4.

The Alco truck, which sells at $3,500, has the same size motor as in the taxicab, and the same motor details obtain throughout. The wheelbase is 110 inches, and it has a side-chain drive, whereas the taxicab has a shaft drive. The tires on the truck are 36 by 5 inches in front and dual 36 by 3 1-2 inches in the rear.

FRANKLIN OFFERS THREE TYPES OF COMMERCIALS THIS YEAR

This line includes Models L-1, L-2 and J-3. Each of these models is provided with the same size motor, which is four-cylinder, air-cooled, with a bore of 3 3-8 inches, and a stroke of 4 inches. The ignition is by Bosch magneto without auxiliary. The mechanical lubricator has four feeds; the multiple disc clutch works in conjunction with a three-speed transmission system, and the wheelbase is 83 inches for Models L-1 and L-2 and 100 inches for Model J-3. These cars weigh 1,750 pounds for Model L-1, 1,850 pounds for



H

E

E—Packard truck with a furniture body in the service of John Wanamaker.

F—Alco 3-ton truck with a 4-cylinder 24-horsepower motor, with a large and commodious platform.

G—Grabowsky truck with a double-opposed motor unit design, located in front, used for delivery by the New York "World" on hilly Staten Island.

H—Packard 3-ton truck with standard body, presenting a long platform, and ample room.

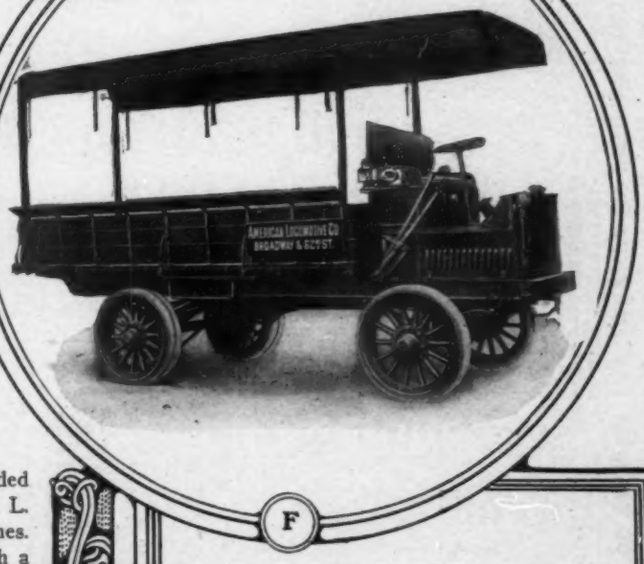
Model L-2 and 2,550 pounds for Model J-3. In view of the power supplied and the load carried, the weight is low.

GRABOWSKY HAS DEMOUNTABLE POWER PLANT

Grabowsky offers four models, but the motor is identical in three of them, namely: 101-A, 313-A and 505-A. This motor is a double-opposed type with a bore of 5 1-2 inches and a stroke of 5 inches. In the Model 507-A the bore is increased to 6 inches, but the stroke remains at 5 inches. The motor is mounted in front on a subframe, and is so contrived with its accessories in a self-contained relation that when the motor is unbolted the entire power plant may be shifted out to the front without disturbing the radiator, which latter equipment is located above and to the rear of the power plant. The radiators used are of the tubular type, but they differ from other radiators in that a steam compartment is introduced above the water level.

KNOX OFFERS A CAR FOR EVERY COMMERCIAL PURPOSE

The Knox line comprises seven distinct models, ranging in price from $1,400 to $4,300; the lightest model has a single-cylinder, 10-horsepower motor and the largest is provided with a four-cylinder motor with a rating of 48.4-horsepower A. L. A. M. This particular motor has a bore and stroke of 5 1-2 inches. Cylinders are individual; a cellular radiator in conjunction with a centrifugal pump provides for cooling, and a Bosch magneto in conjunction with a coil and storage battery is used in the ignition system. The lightest truck weighs 1,800 pounds, and the several sizes range in weight to the largest one which tips the beam at 5,600.



F

PACKARD IS PROVIDING LIBERALLY FOR TRUCK WORK

The best indication of Packard progress in the commercial line is that as represented by the large new plant, which is completed and being fitted out exclusively for the building of trucks. These trucks were especially designed, entirely disregarding Packard pleasure vehicles, and are intended to undertake the most severe service, on a basis of economy of maintenance, rather than to attempt to fix a low purchase price.

The Rapid line has four models, ranging from 20 to 48-horsepower A. L. A. M. rating; two of the models employ a double-opposed motor, and the two heavier trucks have four-cylinder motors, all being water-cooled. Tubular radiators and centrifugal pumps obtain, and ignition is by coil and storage battery.

G

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—FOREIGN GASOLINE PLEASURE CARS

MAKE AND MODEL	Price	H.P.	BODY Type	BODY Seats	MOTOR Cylinders	MOTOR Bore	MOTOR Stroke	MOTOR Cyl. Cast	COOLING Radiator	COOLING Pump	IGNITION Magneto	IGNITION Battery	Lubrication	Clutch	TRANSMISSION Type	TRANSMISSION Speeds	TRANSMISSION Location	TRANSMISSION Drive	Wheelbase	Tread	Frame	BEARINGS Crankshaft	BEARINGS Transmission	BEARINGS Axle	Weight	TIRES Front	TIRES Rear
Benz 18-22	$3500	15.9	Extra	..	4	80	120	Pairs.	H'comb.	Gear	Eisem'n.	None	4 mech.	Cone	Sel.	3	Frame.	Shaft 1.	110	52	P. steel	3 plain.	Ball	Ball	1,680	815x105	815x105
Benz 40-45	6250	35.8	Extra	..	4	120	145	Pairs.	H'comb.	Centrif'l.	Bosch	Storage.	8 mech.	Cone	Sel.	4	Frame.	Shaft 1.	129	56½	P. steel	3 plain.	Ball	Ball	2,460	920x120	935x135
Benz 40-45	6250	35.8	Extra	..	4	120	145	Pairs.	H'comb.	Centrif'l.	Bosch	Storage.	8 mech.	Cone	Sel.	4	Frame.	2-chain.	124	56½	P. steel	3 plain.	Ball	Ball	2,460	920x120	935x135
Benz 60-65	8500	45.2	Extra	..	4	135	150	Pairs.	H'comb.	Centrif'l.	Bosch, 2	Storage.	8 mech.	Cone	Sel.	4	Frame.	2-chain.	129	56½	P. steel	3 plain.	Ball	Ball	3,020	920x120	935x135
Benz 60 Special	8500	32.8	Extra	..	4	115	175	Pairs.	H'comb.	Centrif'l.	Bosch, 2	Storage.	8 mech.	Cone	Sel.	4	Frame.	Shaft 1.	129	56½	P. steel	3 plain.	Ball	Ball	.....	920x120	935x135
C. G. V. 12-14	2500	15.9	Extra	..	4	80	120	Block.	Tubular.	None	Bosch	None	Pump	Cone	Prog.	3	Frame.	Shaft 1.	100	51	P. steel	3 plain.	Ball	Ball	1,800	810x90	810x90
C. G. V. 16-20	3250	22.4	Extra	..	4	95	130	Block.	Tubular.	None	Bosch	Storage.	Pump	Cone	Sel.	4	Frame.	Shaft 1.	116	51	P. steel	3 plain.	Ball	Ball	1,900	875x105	875x105
C. G. V. 18-24	4000	23.8	Extra	..	6	80	120	Pairs.	Tubular.	None	Bosch	Storage.	Pump	Cone	Sel.	4	Frame.	Shaft 1.	116	51	P. steel	4 plain.	Ball	Ball	2,000	875x105	875x105
Clement-Bayard	2500	15.9	Extra	..	4	80	120	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Prog.	3	Frame.	Shaft	110	....	P. steel	.....	.....	.....	.....	810x90	815x105
Clement-Bayard	3000	20.1	Extra	..	4	90	120	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	Shaft	120	....	P. steel	.....	.....	.....	.....	870x90	875x105
Clement-Bayard	3500	24.8	Extra	..	4	100	120	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	Shaft	120	....	P. steel	.....	.....	.....	.....	870x90	875x105
Clement-Bayard	3750	23.8	Extra	..	6	80	120	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	Shaft	125	....	P. steel	.....	.....	.....	.....	.....	.....
Clement-Bayard	4250	30.1	Extra	..	6	90	120	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	Shaft	135	....	P. steel	.....	.....	.....	.....	.....	.....
Clement-Bayard	4250	35.8	Extra	..	4	120	140	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	2-chain.	125	....	P. steel	.....	.....	.....	.....	915x105	920x120
Clement-Bayard	4750	37.2	Extra	..	6	100	120	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	Shaft	135	....	P. steel	.....	.....	.....	.....	.....	.....
Clement-Bayard	4750	48.6	Extra	..	4	140	140	.....	H'comb.	Centrif'l.	Bosch	Storage.	Mech.	Disc.	Sel.	4	Frame.	2-chain.	130	....	P. steel	.....	.....	.....	.....	915x105	920x120
Darracq 25-35	4000	35.8	Tour'g.	5	4	120	120	Pairs.	Tubular.	Gear	Bosch	Storage.	4 mech.	Cone	Sel.	4	Frame.	Shaft 2.	120	54	P. steel	4 plain.	Ball	Ball	2,800	880x120	880x120
De Dion-Bouton	1600	6.2	Extra	..	1	100	130	Single	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	103½	50½	P. steel	2 plain.	Ball	Ball	.....	760x90	760x90
De Dion-Bouton	1800	11.0	Extra	..	4	66	100	Block.	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	107	50½	P. steel	.....	Ball	Ball	.....	760x90	760x90
De Dion-Bouton	2200	6.2	R'bout.	2	1	100	160	Single	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	92	48	P. steel	2 plain.	Ball	Ball	.....	760x90	760x90
De Dion-Bouton	2250	14.0	Extra	..	4	75	120	Pairs.	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	110½	50½	P. steel	3 plain.	Ball	Ball	.....	810x90	810x90
De Dion-Bouton	3500	24.8	Extra	..	4	100	130	Pairs.	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	122½	55	P. steel	3 plain.	Ball	Ball	.....	880x120	880x120
De Dion-Bouton	4500	35.8	Extra	..	4	120	130	Single	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	130½	58	P. steel	5 plain.	Ball	Ball	.....	935x135	935x135
De Dion-Bouton	5500	40.2	Extra	..	8	90	125	Pairs.	Tubular.	Centrif'l.	Bosch	None	Pump	3-plate.	Sel.	3	Frame.	2-shaft.	130½	58	P. steel	3 plain.	Ball	Ball	.....	935x135	935x135
Delaunay-Belleville	2800	17.9	Extra	..	4	85	120	Block.	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	3	Frame.	Shaft 1.	118	....	P. steel	.....	.....	.....	.....	815x105	815x105
Delaunay-Belleville	3250	19.3	Extra	..	6	72	85	Threes	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	Shaft 1.	123	....	P. steel	.....	.....	.....	.....	815x105	815x105
Delaunay-Belleville	3500	23.8	Extra	..	4	98	122	Pairs.	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	Shaft 1.	123	....	P. steel	.....	.....	.....	.....	880x120	880x120
Delaunay-Belleville	4000	19.3	Extra	..	6	72	105	Threes	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	Shaft 1.	128	....	P. steel	.....	.....	.....	.....	920x120	920x120
Delaunay-Belleville	5000	30.1	Extra	..	4	110	130	Single	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	2-chain.	128	....	P. steel	.....	.....	.....	.....	880x120	880x120
Delaunay-Belleville	5100	35.7	Extra	..	6	98	122	Pairs.	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	Shaft 1.	138	....	P. steel	.....	.....	.....	.....	920x120	920x120
Delaunay-Belleville	6100	44.5	Extra	..	4	134	140	Single	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	2-chain.	130	....	P. steel	.....	.....	.....	.....	935x135	935x135
Delaunay-Belleville	7000	49.2	Extra	..	6	115	130	Single	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	2-chain.	144	....	P. steel	.....	.....	.....	.....	935x135	935x135
Delaunay-Belleville	10000	66.8	Extra	..	6	134	140	Single	H'comb.	Centrif'l.	Bosch	Storage.	Pump	Cone	Prog.	4	Frame.	2-chain.	157	....	P. steel	.....	.....	.....	.....	935x135	1000x150
Fiat 12	2750	15.9	Extra	..	4	80	100	Block.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	Shaft 1.	107	54	P. steel	3 plain.	Ball	Ball	1,500	810x90	810x90
Fiat 18	3500	20.1	Extra	..	4	90	120	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	Shaft 1.	120	54	P. steel	3 plain.	Ball	Ball	1,900	810x90	810x90
Fiat 25	4500	30.0	Extra	..	4	110	130	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	Shaft 1.	120	56	P. steel	3 plain.	Ball	Ball	2,350	820x120	820x120
Fiat 45	5000	41.9	Extra	..	4	130	140	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	2-chain.	126	56	P. steel	3 plain.	Ball	Ball	2,500	920x120	920x120
Fiat 45	5250	41.9	Extra	..	4	130	140	Pairs.	H'comp.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	Shaft 1.	125	56	P. steel	3 plain.	Ball	Ball	2,550	920x120	920x120
Fiat 45	6000	45.0	Extra	..	6	110	130	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	2-chain.	130	56	P. steel	4 plain.	Ball	Ball	2,650	920x120	920x120
Fiat 90	7500	41.9	Extra	..	4	130	190	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	2-chain.	114	56	P. steel	4 plain.	Ball	Ball	2,425	880x120	880x120
Hotchkiss Z	2850	15.9	Extra	..	4	80	110	Block.	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	3	Frame.	Shaft 2.	109½	53	P. steel	3 plain.	Ball	Ball	2,200	810x90	810x90
Hotchkiss T	3650	22.4	Extra	..	4	95	110	Block.	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	4	Frame.	Shaft 2.	119	53	P. steel	3 plain.	Ball	Ball	2,500	975x105	875x105
Hotchkiss X	4500	30.0	Extra	..	4	110	130	Pairs.	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	4	Frame.	Shaft 2.	126	55	P. steel	3 plain.	Ball	Ball	3,000	880x120	880x120
Hotchkiss V	6500	53.6	Extra	..	6	120	140	Pairs.	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Cone	Sel.	4	Frame.	Shaft 2.	143½	55	P. steel	4 plain.	Ball	Ball	3,500	920x120	920x120
Isotta-Fraschini	2750	10.5	R'bout.	2	4	65	100	Block.	H'comb.	Centrif'l.	Eisem'n.	None	3 mech.	Disc.	Sel.	4	Frame.	Shaft 1.	82½	49½	P. steel	2pl.,1bl.	Ball	Ball	1,450	810x90	810x90
Isotta-Fraschini	3500	20.1	Extra	..	4	90	120	Pairs.	H'comb.	Centrif'l.	Bosch	None	3 mech.	Disc.	Sel.	4	Frame.	Shaft 1.	118	55½	P. steel	2pl.,1bl.	Ball	Ball	1,850	875x105	875x105
Isotta-Fraschini	4500	30.0	Extra	..	4	110	130	Pairs.	H'comb.	Centrif'l.	Bosch	None	4 mech.	Disc.	Sel.	4	Frame.	Shaft 1.	120	55½	P. steel	2pl.,1bl.	Ball	Ball	2,150	870x90	880x120
Isotta-Fraschini	5600	41.9	Extra	..	4	130	150	Pairs.	H'comb.	Centrif'l.	Bosch	None	4 mech.	Disc.	Sel.	4	Frame.	Shaft 1.	124	55½	P. steel	2pl.,1bl.	Ball	Ball	2,450	875x105	935x135
Isotta-Fraschini	5600	41.9	Extra	..	4	130	150	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	2-chain.	124	55½	P. steel	2pl.,1bl.	Ball	Ball	2,400	875x105	935x135
Isotta-Fraschini	6500	41.9	R'bout.	2	4	130	150	Pairs.	H'comb.	Centrif'l.	Bosch	None	4 mech.	Disc.	Sel.	4	Frame.	2-chain.	110	55½	P. steel	2pl.,1bl.	Ball	Ball	2,400	875x105	935x135
Isotta-Fraschini	7500	55.8	Extra	..	4	150	150	Pairs.	H'comb.	Centrif'l.	Bosch	None	Mech.	Disc.	Sel.	4	Frame.	2-chain.	128	55½	P. steel	2pl.,1bl.	Ball	Ball	2,700	875x105	935x135
Isotta-Fraschini	8500	52.2	R'bout.	2	4	145	120	Pairs.	H'comb.	Centrif'l.	Eisem'n.	None	4 mech.	Disc.	Sel.	4	Frame.	2-chain.	118	55½	P. steel	2pl.,1bl.	Ball	Ball	2,500	870x90	880x120
Lancia 12-16	3000	20.1	Extra	..	4	90	100	Pairs.	H'comb.	Centrif'l.	Bosch	None	Pump	Disc.	Sel.	4	Frame.	Shaft 1.	110	54	P. steel	3 plain.	Ball	Ball	1,800	810x100	820x120
Lancia 20	3300	22.4	Extra	..	4	95	110	Block.	H'comb.	Centrif'l.	Bosch	None	Pump	Disc.	Sel.	4	Frame.	Shaft 1.	115	54	P. steel	3 plain.	Ball	Ball	1,800	810x100	820x120
Lancia 20 Special	3500	22.4	R'bout.	2	4	95	110	Block.	H'comb.	Centrif'l.	Bosch	None	Pump	Disc.	Sel.	4	Frame.	Shaft 1.	105	54	P. steel	3 plain.	Ball	Ball	1,800	810x100	820x120
Panhard-Levassor	5500	20.1	Limous.	7	4	90	130	Single	H'comb.	Centrif'l.	Eisem'n.	Storage.	Pump	Disc.	Prog.	4	Frame.	Shaft 1.	115	56	P. steel	5 plain.	Ball	Ball	2,900	875x105	875x105
Panhard-Levassor	6500	33.6	B. tonn.	5	6	95	130	Single	H'comb.	Centrif'l.	Eisem'n.	Storage.	Pump	Disc.	Prog.	4	Frame.	Shaft 1.	115	56	P. steel	7 plain.	Ball	Ball	2,700	880x120	880x120

NOTE—These tables are a continuation and conclusion of those published in the issue of February 3.

DETAILS OF CARS ON THE AMERICAN MARKET FOR 1910—FOREIGN GASOLINE PLEASURE CARS—(Continued)

MAKE AND MODEL	Price	H.P.	BODY		MOTOR				COOLING		IGNITION		Lubrication	Clutch	TRANSMISSION				Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
			Type	Seats	Cylinders	Bore	Stroke	Cyl. Cast	Radiator	Pump	Magneto	Battery			Type	Speeds	Location	Drive				Crankshaft	Transmission	Axle		Front	Rear
Renault 10-12	$3500	12.2	Land't.	5	4	70	115	Block	Tubular	None	Bosch	None	5 mech.	Cone	Prog.	4	Frame	Shaft 2.	99	53	P. steel	2 plain.	Ball	Ball	1,800	810x90	810x90
Renault 20-30	5500	24.8	Tour'g.	5	4	100	140	Pairs	Tubular	None	Bosch	None	5 mech.	Cone	Prog.	4	Frame	Shaft 2.	120	55	P. steel	3 plain.	Ball	Ball	2,800	915x105	920x120
Renault 18-24	5750	23.8	Land't.	5	6	80	120	Threes	Tubular	None	Bosch	None	7 mech.	Cone	Prog.	4	Frame	Shaft 2.	120	55	P. steel	3 plain.	Ball	Ball	3,500	875x105	880x120
Renault 25-35	5800	32.8	Tour'g.	7	4	115	160	Pairs	Tubular	None	Bosch	None	5 mech.	Cone	Prog.	4	Frame	Shaft 2.	128	55	P. steel	3 plain.	Ball	Ball	3,500	915x105	920x120
Zust 20-30	3900	32.8	Extra		4	115	120	Pairs	H'comb.	Centrif'l.	Bosch	None	5 mech.	Disc.	Sel.	4	Frame	Shaft	120		P. steel	5 plain.	Ball	Ball	2,000	910x90	920x120
Zust 35-45	4750	41.9	Extra		4	130	140	Pairs	H'comb.	Centrif'l.	M & B	None	5 mech.	Disc.	Sel.	4	Frame	Shaft	128		P. steel	5 plain.	Ball	Ball		910x90	920x120

STEAM PLEASURE AND COMMERCIAL CARS

MAKE AND MODEL	Price	Body	Seats	ENGINE							Boiler	Condenser	TRANSMISSION			Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES	
				No. Cylinder	Type	Action	Bore	Stroke	Valves	Position			Change-gear	Speeds	Drive				Engine	Transmission	Axle		Front	Rear
Lane "19"	$1250	Roadster	3	2	Compound.	Double	3½ & 5½	3½	Slide	Middle	F-tube	Yes	None		1-chain	99	56	Channel.	Roller.	Roller.	Roller.	2,200	32x4	32x4
Lane "20"	1500	Touring	5	2	Compound.	Double	3½ & 5½	3½	Slide	Middle	F-tube	Yes	None		1-chain	103	56	Channel.	Roller.	Roller.	Roller.	2,400	32x4	32x4
Lane "21"	2400	Baby tonn.	4	2	Compound.	Double	3½ & 6½	4	Slide	Middle	F-tube	Yes	None		1-chain	119	56	Channel.	Roller.	Roller.	Roller.	3,100	36x4	36x4
Lane "22"	2500	Touring	7	2	Compound.	Double	3½ & 6½	4	Slide	Middle	F-tube	Yes	None		1-chain	125	56	Channel.	Roller.	Roller.	Roller.	3,500	36x4	36x4½
Michigan D	4000	Truck, 3 t'n		8	Quadruple.			3	Slide	Middle	F-tube	Yes	Yes	1	2-chain	140	66	Channel.	Plain.	Roller.	Roller.	4,500	4½	Dual.
Stanley "60"	850	Runabout.	2	2	Simple	Double	3½	4½	Slide	Axle	F-tube	None	None		Gears	104	56	Wood	Ball	Ball	Ball	1,500	34x3	34x3
Stanley R	1400	Roadster.	4	2	Simple	Double	4	5	Slide	Axle	F-tube	None	None		Gears	114	56	Wood	Ball	Ball	Ball	2,000	36x3½	36x3½
Stanley U	1500	Touring	5	2	Simple	Double	4	5	Slide	Axle	F-tube	None	None		Gears	114	56	Wood	Ball	Ball	Ball	2,100	36x4	36x4
White O-O	2000	Touring	5	2	Compound.	Double	2½ & 4½	3	Joy	Front	Flash	Yes	Sliding	2	Shaft 2.	110	56	P. steel	Ball	Ball	Ball	2,300	32x4	32x4
White M-M	4000	Touring	7	2	Compound.	Double	3 & 5	4½	Joy	Front	Flash	Yes	Sliding	2	Shaft 2.	122	56	P. steel	Ball	Ball	Ball	3,600	36x4	36x5

ELECTRIC COMMERCIAL CARS

MAKE AND MODEL	Price	BODY		MOTOR			BATTERIES			SPEEDS		First Reduction	Drive	Wheelbase	Tread	Frame	BEARINGS			Weight	TIRES (Solid)	
		Type	Tons	Number	H.P.	Location	Type	No. Cells	Location	Forward	Reverse						Motor	Transmission	Axle		Front	Rear
Buffalo T		Ambulance		Two		Rear	Option, 11-plate	42	Middle	4	4	Gears	Double chain.			Channel					34x2½	34x2½
Buffalo O		Express	1	Two		Rear	Option, 13-plate	42	Middle	4	4	Gears	Double chain.			Channel					36x3½	36x3½
Buffalo P		14-passenger		Two		Rear	Option, 13-plate	42	Middle	4	4	Gears	Double chain.			Channel					36x3½	36x4
Buffalo S		Truck	5	Two		Rear	Option, 19-plate	42	Middle	3	3	Gears	Double chain.			Channel					36x5	36x6
Lansden 356	$1950	Rack H	2	One.	3.4	Rear	Edison A-4	45	Middle	3	2	Chain	Double chain.	120	52	Armored	Plain	Plain	Plain	2,750	18x6	24x6
Lansden 76	2550	Panel E	½	One.	3.4	Rear	Edison A-4	60	Middle	4	2	Chain	Double chain.	88	56	Armored	Plain	Plain	Plain	2,700	32x2½	32x2½
Lansden 186	2650	Panel E	1	One.	3.4	Rear	Edison A-4	60	Middle	3	2	Chain	Double chain.	88	56	Armored	Plain	Plain	Plain	3,000	32x3	32x3
Lansden 86	3150	Express A	1½	One.	4.5	Rear	Edison A-6	60	Middle	3	2	Chain	Double chain.	100	66	Armored	Plain	Plain	Plain	3,850	32x3½	32x3½
Studebaker 251	1825	Panel	½	One.	2	Rear	Exide 11 MV	26	Middle	4	4	Gears	Double chain.	74	58	Angle	Plain	Ball	Ball	2,775	36x2½	42x2½
Studebaker 20	2300	Panel		Two	1½	Rear	Exide 9 MV	44	Middle	4	4	Gears	Double chain.	91	56	Angle	Plain	Plain	Plain	3,800	36x3	42x3
Studebaker 27	2800	Express		Two	3½	Rear	Exide 13 MV	44	Middle	4	4	Gears	Double chain.	104	58½	Angle	Plain	Plain	Plain	5,500	36x4	42x4
Studebaker 2024	3250	Stake		Two	3½	Rear	Exide 15 MV	44	Middle	4	4	Gears	Double chain.	117	64½	Angle	Plain	Plain	Plain	7,070	36x5	36x3½d
Studebaker 28.1	3850	Stake		Two	3½	Rear	Exide 17 MV	44	Middle	4	4	Gears	Double chain.	127	75	Angle	Plain	Plain	Plain	8,900	36x5	42x4d
Studebaker 24	4500	Stake	5	Two	3½	Rear	Exide 19 MV	44	Middle	4	4	Gears	Double chain.	132	69½	Angle	Plain	Plain	Plain	10800	36x7	42x4d

LATEST KNIGHT DEVELOPMENTS

SILENCE commends itself, at least in automobile construction, and the combination of silence with increased efficiency is one that every automobile designer in the country is striving to obtain. The attainment of this combination, to a very considerable degree, is the claim of the Knight motor, and that the claim is justified, a year's service of stock models in the hands of ordinary purchasers has amply proved.

The first public appearance of the Knight slide valve was at the Chicago show of 1906, where a car was exhibited by Knight & Kilbourne. This car was illustrated and described in THE AUTOMOBILE, February 15, 1906. Quite a little comment was excited, by no means all of it favorable, and it is not believed that the actual sales were sufficient to increase noticeably the manufacturer's bank account. Like many another novelty, interesting for the moment, the Knight motor had almost been forgotten when in the early part of 1908 announcement was made that it had been adopted by the Daimler Motor Company, of Coventry, England, one of the oldest and supposed to be one of the most conservative of British manufacturers.

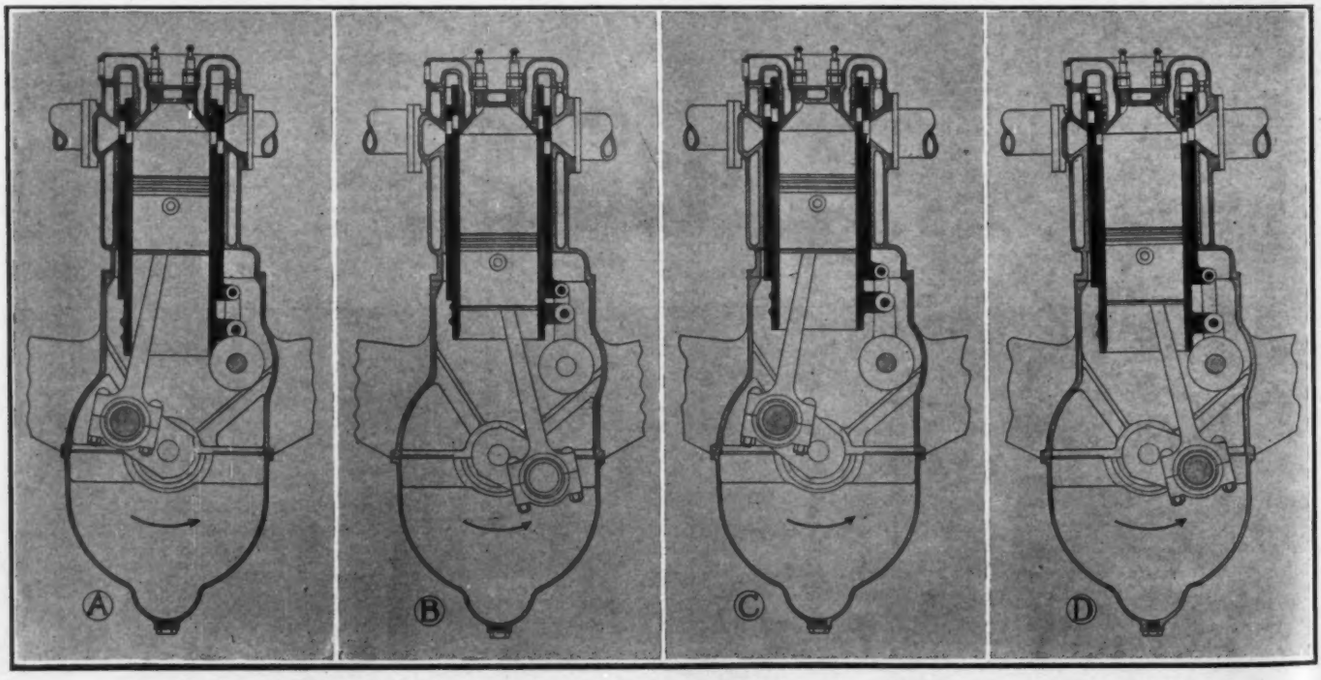
True to its word, the Daimler Company used the Knight valve system on all of its 1909 product, and these cars are in use with great success, both in England and on the Continent. Further, the Minerva Motor Company, of Antwerp, Belgium; Panhard & Levassor, of Paris, France; the Daimler Motoren Gesellschaft, of Untertuerckheim, Germany, which makes the Mercedes, and the Deluca Daimler Company, of Naples, Italy, have all received from Mr. Knight permission to use his valve system, and it is a matter of positive knowledge that four prominent American makers are experimenting with it, one having six cars so equipped actually on the road.

Most people interested in automobile design know that the Knight valve system consists of two concentric sleeves or liners in each cylinder, which move up and down and thereby open or close ports in the cylinder walls which act as inlet and exhaust valves. The exact operation of these sleeves, however, has been more or less a mystery. This is not unnatural, for the movements are much more complex than those of an ordinary poppet valve system. With this in view, the Daimler Company has had made and sells at one shilling sixpence an ingenious cardboard working model of the Daimler-Knight motor. Drawings from this model in four typical positions are shown herewith.

The inlet and exhaust ports in the cylinder wall are diametrically opposite. Each sleeve has in it two slots, one for the inlet and one for the exhaust. It is obvious that to secure the valve opening the slots in the two sleeves must simultaneously register with each other and with the port in the cylinder wall. The inlet and exhaust slots in the inner sleeve are on the same level; on the outer sleeve the inlet slot is considerably above the exhaust slot. The sleeves are moved up and down by eccentrics on a shaft corresponding to the camshaft of an ordinary motor.

The crucial point is the timing of these eccentrics, and the corresponding movements imparted to the sleeves with respect to each other and to the cylinder. The inner sleeve reaches its highest point at the beginning of the expansion stroke, and its lowest point consequently at the end of the exhaust stroke and the beginning of the inlet stroke. The outer sleeve, on the other hand, is about half a revolution away from the inner one; it reaches its highest point at the end of the expansion stroke and its lowest at the end of the suction stroke. At the highest point in the travel of the outer sleeve its exhaust slot is approximately in registry with the exhaust port of the cylinder, and at its lowest point registers with the inlet port. The inner sleeve, on the contrary, has both of its slots in registry with their ports when it is at the bottom of its stroke.

It is now possible intelligently to follow the motor through an entire cycle. Beginning with the inlet stroke, the inner sleeve has its port in line, and the opening is affected by the downward movement of the outer sleeve, bringing its slot into line. Then both sleeves move upward together at the end of this stroke. This upward movement leaves the exhaust slot of the outer sleeve in line with the exhaust port. During the expansion stroke the inner sleeve is moving downward, and the exhaust opening is effected when its slot comes into registry with the other two. Then, while the inner sleeve stands still, the outer sleeve begins a downward movement which results in the



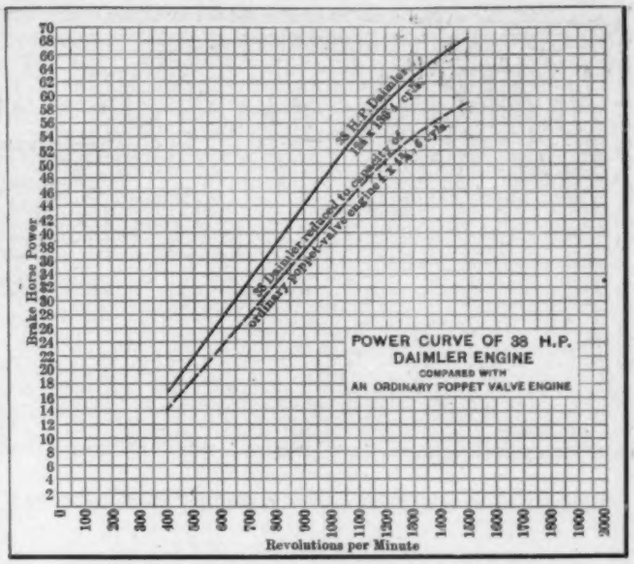
Section Through Knight Motor, Showing at A Inlet, at B Compression, at C Firing, and at D Exhaust

closing of the exhaust port and the opening of the inlet.

The most enthusiastic advocates of the Knight system do not claim that it is simpler than the poppet valve mechanism. To the two poppet valves in each cylinder correspond the two sleeves; these must be ground with the utmost accuracy on both the inner and outer walls. The camshaft is replaced by the eccentric shaft, and the valve tappets by the connecting rods between the eccentrics and the sleeves which they actuate. Springs, however, are dispensed with. In addition, the Knight motor cylinder must have a removable head fitted with three additional packing rings, to keep tight the joint between the head and the inner sleeve.

First of the objections offered against this construction is the difficulty of lubricating the sliding sleeves. This difficulty on the face of it seems considerable; yet the best evidence possible to quote in proof that it has been overcome is the successful use of stock cars for a year and more. Although it is not known just what provision the Daimler Company has made in this respect, at least one of the American concerns at present experimenting with the motor has worked out a scheme whereby the cylinder lubricating oil is forced to pass between the sleeves on its way to the piston. It should be remembered that the speed of the sleeves is only about one-fifth that of the piston, and that no thrust is exerted on them by the explosion save that resulting from the angularity of the connecting rod. This is one of the principal differences between the Knight system and other kinds of slide valves and rotary valves, in which any pressure in the cylinder means an equal lateral pressure of the valve against its seat.

In the size of its valve openings the Knight motor is superior to those using poppets. It is customary to speak of a poppet valve as being so many inches in diameter, and to an untechnical mind a poppet valve two inches in diameter has little to distinguished it from an open hole of the same diameter. Actually a poppet valve offers but a narrow slit or opening, and when the valve is in a pocket this slit is effective only on the side nearest the cylinder bore. On the Knight motor the slit is of double or triple the width, and directly in the cylinder wall.


Brake Horse Power
Revolutions per Minute
POWER CURVE OF 38 H.P. DAIMLER ENGINE
COMPARED WITH
AN ORDINARY POPPET VALVE ENGINE
38 H.P. Daimler
38 Daimler reduced to capacity of ordinary poppet-valve engine
ordinary poppet-valve engine

Power Curve of 38-Horsepower Knight Engine

Indicator curves taken from Knight motors show a very perfect expansion line; the increase of pressure following ignition is not sudden or excessive, and the pressure falls off with more regularity and uniformity than in poppet valve motors. The mean effective pressure is claimed to be in the neighborhood of 100 pounds to the square inch, as against say 70 pounds for the ordinary motor. Although it is difficult to assign a wordy reason, the fact remains. Further, the Knight motors show a far more uniform relation of power and speed than usual. Their power curves are practically straight lines, and it has often been found impossible to reach the peak of the curve in tests, without serious danger of injury to the mechanical components of the motor. No better demonstration could be asked of the efficiency of the valves, considered as a method of transferring gases.

FOREIGN CARS STILL HOLD THEIR AMERICAN MARKET

ALTHOUGH the foreign cars sold in this country no longer maintain their former position of haughty superiority, American designers cannot suppose that there is nothing to be learned from the invaders. In details of construction which reveal thought and experience, as well as in more prominent features, the foreign cars which have been exhibited at the various shows have much that is of interest.

In the domain of light town cars Fiat is building a chassis of 12 horsepower, nominal, which for this purpose could hardly be surpassed. The motor has four cylinders 80 by 100 millimeters (3.15 by 3.94 inches), cast in a block, with all valves on the left side. The hood is very short, so that with a wheelbase of 107 inches there is ample room for an extension coupé body with wide doors; at the same time the radiator does not project over the front axle. There are no levers on top of the steering wheel, the spark being fixed and the throttle controlled solely by a foot button.

The smallest four-cylinder motor on the market in this country is the Isotta, used in their runabout built under the French voiturette rules. Its bore and stroke are 65 and 100 millimeters (2.56 and 3.94 inches) respectively. Isotta, like Fiat, has not quite decided the chain versus shaft drive question to its own satisfaction, and has some of each.

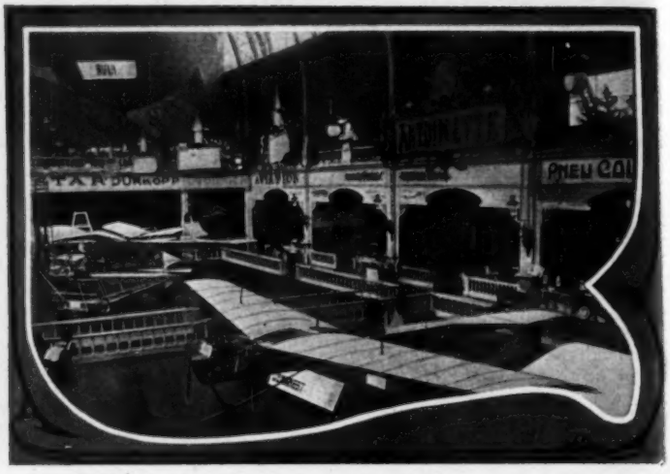
De Dion-Bouton is a prominent exponent of the single-cylinder motor for light runabouts, and has two models of this type. One of these is a standard design with bore and stroke of 100 and 130 millimeters (3.94 and 5.12 inches) respectively; in the other, built under voiturette rules, the stroke is 160 millimeters (6.30 inches). The latter is a remarkably fast car, and can take the measure of many four-cylinders of greater rated power.

Going to the opposite extreme, De Dion is building an eight-cylinder car of remarkably heavy and solid construction, with axles and frame which recall commercial practice. All De Dion models have two distinctive features, the three-plate clutch and the double shaft drive. In the latter, the gear-box and differential are exactly the same as for a car with double chain drive, but are located so that the jackshaft is just over the rear axle. The shafts which should carry the sprockets on their outer ends, are instead provided with two universal joints each and project directly into the hubs of the wheels, as in the regular full-floating rear axle. The axle itself is a solid I-beam.

Two models are featured by Panhard for American service, a four-cylinder town car and a six-cylinder touring model. The touring car has its cylinders cast separately but bolted together into a semblance of a block construction; the idea is exactly the same as that embodied on two well-known American cars.

Six-cylinder motors with the cylinders cast in threes are much favored in foreign practice, although the only American maker who tried this construction dropped it after one year. Those using the triplet cylinders are Delaunay-Belleville, on two models, and Renault on one. All of these are very small motors, the Delaunays being 72 by 85 millimeters (2.84 by 3.35 inches) and 72 by 105 millimeters (2.84 by 4.14 inches), respectively, and the Renault 80 by 120 millimeters (3.15 by 4.73 inches).

FROM THE EUROPEAN MAIL



Antoinette Exhibited Its Graceful Monoplane at Brussels

FRENCH AUTO SALON ASSURED FOR 1910

PARIS, Feb. 2—It is now practically certain that there will be an automobile show in Paris this year, for the constructors who eighteen months ago voted against the annual exhibition have just voted in private for the renewal of the interrupted annual event. When they voted against the show the constructors formed part of an association under the auspices of the Automobile Club of France, in which they had as companions accessory manufacturers and dealers, tire manufacturers, body makers and a host of others who figured largely on the voting list, although being comparatively unimportant financially. It was only by forming a solid body, and refusing to exhibit despite the vote that the automobile manufacturers had their way.

No date has yet been fixed for the show, nor have any regulations been drawn up. It is probable, however, that the event will be held late in November or early in December. It is impossible to hold it earlier, for the aeronautical manufacturers, who are also holding a show under their direct management, without the aid of outside club or association, have secured the Grand Palais in the Champs-Elysées from October 15 to November 2.

Dirigible "Belgica," a Feature of the Brussels Salon

MANY FRENCH FACTORIES INUNDATED

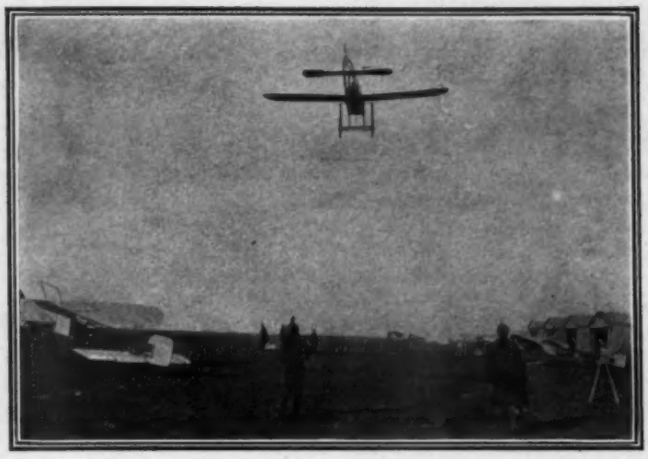
PARIS, Feb. 2—More than any other industry has the automobile suffered by the floods in the Seine valley. At least three-quarters of the automobile factories of France are clustered on the low-lying banks of the Seine in the northwestern suburbs of Paris. When the river overflowed its banks and worked into the basements of all the factories, extinguishing the fires, nothing remained to be done but to close the doors. In several cases, indeed, the doors have been barricaded by water, making it impossible to enter the factory except by boat. Practically the only large firm not having suffered, and not likely to suffer, by the flood is Panhard & Levassor, whose factory is on high ground.

Renault was one of the first to close the doors of its factory, thus throwing 2,500 men out of employment. Voisin, the aeroplane constructor, being separated from the river by the width of the roadway only, was an early sufferer. Esnault-Pelterie, although further inland, soon had to abandon work. At Puteaux the Darracq, Unic, Saurer, Vinot-Deguingand, De Dion-Bouton, Mercedes, and Charron shops have all had to be closed. Among the body makers who are adversely affected are Védrine and Kellner. On the opposite bank of the river the Clément-Bayard works have only been kept open by the use of three powerful pumps and a brick wall hastily built to keep out the water. Santos-Dumont's private workshop is surrounded by a sheet of water and has had to be abandoned. The Antoinette aeroplane works have had to be closed owing to the impossibility of reaching them through the surrounding water.

IMPERIAL PATRONAGE FOR RUSSIAN SHOW

PARIS, Feb. 2—Russia will hold an automobile show for the third time in the Michel Riding Hall, St. Petersburg, from May 28 to June 9. The first event took place in 1907, the second in the following year, and the third is to be held after an interval of 24 months. The automobile outlook is promising in the land of the Czars, as there is a very large section of the wealthy population eager to take to the new mode of locomotion. The authorities are well disposed toward the automobile industry, and the main highways are being rapidly improved, primarily for military purposes, but at the same time for the benefit of the new industry. As a proof of the favor with which the automobile is regarded in high quarters, the Automobile Club of Russia has been given the right to incorporate the word "Imperial" in its title.

Maurice Clement on a Santos Made in the Clement Factory



Leblanc in Flight at the Aviation School at Pau, France

FRANCE MAKES TROUBLE OVER AERO DATES

PARIS, Feb. 2—Because an aeronautical meeting in England appeared to clash with French interests, the Commission Aerienne Mixte, the governing body in France, called a meeting, revised the calendar drawn up by the International Federation, and set it up to the superior body with the threat that it must be accepted in place of the list of events drawn up a week before.

The new calendar had struck out the English meeting, originally announced for July 11 to 16, and so modified the French dates that there was practically a continuous aviation meeting, under different managements, from June 19 to August 21. Although the second English meeting was allowed to retain its date from August 6 to 13, a French meeting organized by an enterprising Parisian newspaper was allowed to have exactly the same date. As no French aviator can take part in the first boycotted English meet, and is not likely to want to take part in the second one, in view of the greater attractions in his own country, the position allotted to England is not a very important one.

Naturally John Bull is furious, declaring that July 11 to 16 having been granted him, he will not release it without a struggle. If the International Federation decides for England, France will withdraw; if, on the other hand, it decides for France England will find herself in the impossibility of holding any meeting of more than local importance. Whatever the justice of the case, victory appears to lie with France, for as she possesses practically a monopoly of aviators she can either enforce her wishes or defy the international body.

The trouble arises from the fact that the Rheims authorities, the Automobile Club of France, and the Brussels aeronauts wish to work together with a series of meetings following one another without a break. As soon as the Rheims program has been pulled off, there will be a cross-country flight through the champagne country, over the northeast of France, and the Belgian frontier, to Brussels, the event being under the control of the Automobile Club of France.

The revised program comprises 11 international events, each having an assured prize list of not less than $40,000, and 16 national events offering smaller amounts in prizes. The total amount offered in prizes at these public meetings is $675,000.

M. BALSAN REMODELS HIS BLERIOT

PARIS, Feb. 2—Léon Delagrange's untimely death, as the result of flying a Blériot with a Gnome motor, has not prevented other aviators from employing the same combination. One of the most interesting of these has been brought forth by Jacques Balsan, who has replaced his 25-horsepower Anzani with a 50-horsepower revolving Gnome, and as a consequence increased his speed about 20 per cent. Unlike the Delagrange outfit, however, the Balsan aeroplane has been specially designed for the greater strain under which it will work. The four longitudinal frame members forming the main body of the aeroplane are united by two steel girder work crosses, one at the forward extremity and the other a little further to the rear. The motor is carried between these two, the external ball bearings of the crankshaft being in the center of the metallic cross. The propeller is mounted directly on the end of the projecting shaft.

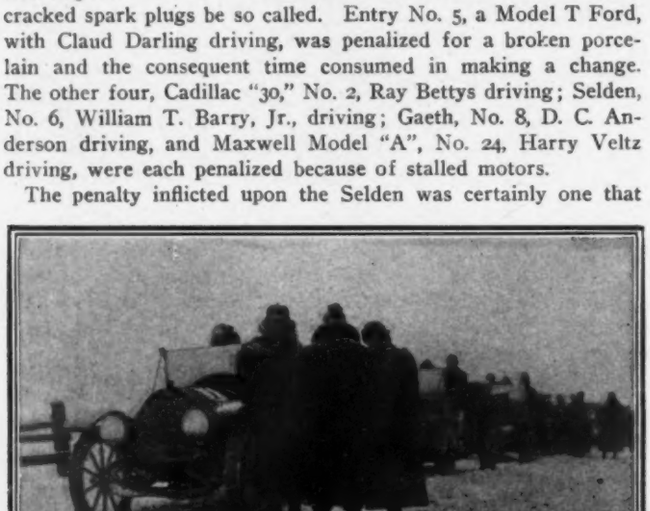
A circular sheet-metal screen surrounds the radiating cylinders, at the same time concentrating the current of air on the motor and preventing the splashing of oil in the face of the pilot. Up to the present this has been one of the minor disadvantages of the Blériot aeroplanes, the pilots often being obliged to descend owing to the blinding spray of oil. The attachment of the wings to the body has been considerably strengthened and the wing-warping cables made more powerful.

Jacques Balsan and His Rebuilt Bleriot with Gnome Motor

ROCHESTER-SYRACUSE RUN MEETS SUCCESS

ROCHESTER, N. Y., Feb. 4—Of the twenty cars that left here on Wednesday morning as participants in the second winter endurance run of the Automobile Club of Rochester to Syracuse and return fifteen checked back last night with absolutely perfect scores. Still more remarkable—of the five penalties imposed not one was due to mechanical trouble unless cracked spark plugs be so called. Entry No. 5, a Model T Ford, with Claud Darling driving, was penalized for a broken porcelain and the consequent time consumed in making a change. The other four, Cadillac "30," No. 2, Ray Bettys driving; Selden, No. 6, William T. Barry, Jr., driving; Gaeth, No. 8, D. C. Anderson driving, and Maxwell Model "A", No. 24, Harry Veltz driving, were each penalized because of stalled motors.

The penalty inflicted upon the Selden was certainly one that



Chalmers "40" Held Up by Pace-Maker Amid Snow-Drifts

might well be termed hard luck. The car was perfect in every respect and had driven up to within 20 feet of the checking-out line and was standing idle with the motor running. In answer to the checker's signal to come ahead the clutch was slipped in, and at almost the same instant, the front wheels sank into deep snow with just enough jar to stall the motor. The little Maxwell also belongs in the same class, for the penalty imposed in this case was due to another contestant backing into the little car and thus causing Veltz to stall the motor.

The pacemaker was a Palmer-Singer 6-60, driven by Bert Van Tuyle, secretary of the Rochester club. The press car, entered at the last moment, was an Oldsmobile 4-cylinder, owned and driven by Thomas J. Northway, one of the prominent dealers of Rochester. This car was also of considerable value in assisting the pacemakers in opening the terrible roads. With representatives of THE AUTOMOBILE and MOTOR AGE in this car, were also, Walter A. Stewart, of the Rochester *Times*, and E. R. Partridge of the Rochester *Herald*.

In point of miles the run was short, being but a little over 200, going and coming from Syracuse, but there is no doubt in the minds of any of the participants but that the mileage covered offered more severity than three or four times the distance under ordinary conditions.

Starting Wednesday morning the run to Clyde was easy, as the roads were well cleared, but from Clyde through to Syracuse that afternoon, mere words seem but weak expression of conditions encountered. In two different places it was necessary to tear down farm fences, fill deep ditches with fence rails after digging out many feet of snow, and take to the farmers' fields for over a mile. Then, in the middle of one field, another deep ditch was encountered, and it required an hour for about thirty men with shovels and picks to clear out the ditch and fill it with solid rails.

On the return from Syracuse Thursday over the southern roads via Auburn and Geneva, the most terrible weather conditions were the rule. Early in the morning it started to rain; within the hour it was snow, and within two hours the thermometer had dropped to below twenty. Add to this a driving gale, bearing down from the northwest, squarely into the faces of the drivers, and some idea may be gleaned of the hardship of that second day's trip. Goggles were unavailable because of the snow, and after some of the boys had cut their faces to the point of bleeding, veils were bought and wrapped around the heads of the drivers.

Those cars with perfect scores will have to participate in another run, according to the rules of the contest.

ENTRANTS OF ROCHESTER-SYRACUSE ENDURANCE RUN

Order of Starting	Makes of Automobiles	Driver	Score
1	Chalmers 40	J. W. Ellis	1000
3	Cadillac 30	Edw. Martin	1000
4	Ford T	Fred Rockleman	1000
7	Selden	Jack Harrigan	1000
9	E-M-F	F. W. Peck	1000
10	Franklin	John Burns	1000
14	Cunningham	W. Kelman	1000
15	Cunningham	H. Holton	1000
16	Maxwell K	George Bower	1000
17	Pullman	Ray Hollis	1000
18	Speedwell	W. Holtzmiller	1000
19	Chalmers 30	Jack Ward	1000
20	Oakland	Dick Geyer	1000
21	Chalmers 30	H. A. Strickland	1000
22	Selden	Hector Carmella	1000
2	Cadillac 30	Ray Bettys	999
6	Selden	W. T. Barry Jr.	999
8	Gaeth	D. C. Anderson	999
24	Maxwell A	Harry Veltz	999
5	Ford T	Claud Darling	990

Palmer-Singer Pace-Maker Arriving at the Clyde Control

Cadillac Number 2 Checking Out, with Others Ready

NEW MOTOR OF MERIT IN ACCESSORY FIELD

SO GREAT has been the demand for accessories, and in particular what might be called the major accessories, exceeding by far the supply, that the entry of any well-equipped firm into this line will be welcomed by all makers of automobiles not building every part in their own shops—and their number is legion. So it is, that the entry of the Chester Engineering and Machine Company, of Chester, Pa., into the accessory field with a pair of very neat block engines, will be singularly welcome. This firm, located at Front and Penn streets, in Chester, has a large and well-equipped shop, the whole extent of which is now being turned over to the construction of automobile and marine engines, whereas previously, a number of other parts were built. This previous experience is of value, in that the firm is not to be classed with the untried and untested.

Two models of engines will be built, these varying mainly in size, the design being common to both. This motor is known as the Penn, and is of the four-cylinder, block type, with tee heads. The smaller engine is illustrated herewith, the size of this being 3 9-16 in. bore by 4 3-4 in. stroke. In adopting the block construction and the very long stroke, the firm has shown a commendable knowledge of the latest in motor design, both at home and abroad. This bore and stroke give a ratio of 1 to 1.33, which is above the average of long strokes, and very close to the highest ratio now in use in this country. This very long stroke should result in the development of power at very low speeds. Since this is easy on bearings and other wearing parts, the result to the user should be long life, and small upkeep expense, as well as fuel economy.

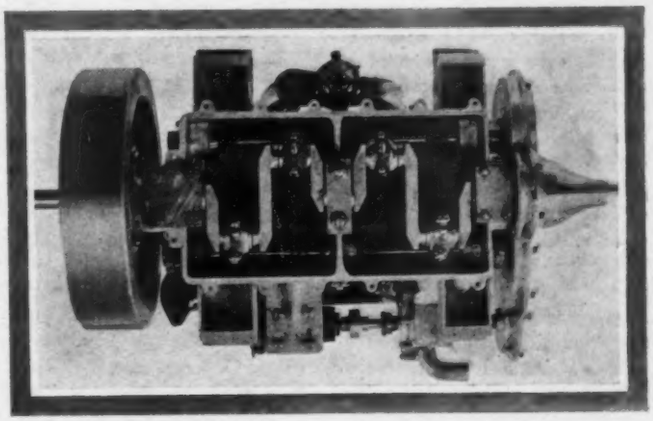
Despite the compactness of the block construction, the crankshaft has three bearings, the middle one being fairly liberal considering the circumstances. The end bearings, on the other hand, are very long, so that the total length or area of bearing surface is very large in relation to the size and power of the engine. Although of the block type of casting, the space between the lower parts or barrels of the cylinders is not solid metal, but is cored out, thus securing lightness and superior cooling ability.

Power rating is according to the usual formula, so that the engine is called a 19.6 horsepower unit. As a matter of fact, however, the engine develops over 20 at 1,100 and has developed as high as 26.8 horsepower at 1,200 revs. This extreme power output is rendered possible by large valves, the size of the clear valve opening for this small engine being 2 in., which is far in excess of that usually considered as a maximum, namely, half of the cylinder diameter. The latter figure in this case would be but 1 3-4 in., so it is seen that the valve size is very unusual. Large valves give a low lift for the same volumetric area of opening, which, in turn, makes for extreme quietness. This is one of the factors which have made this motor very silent in its action.

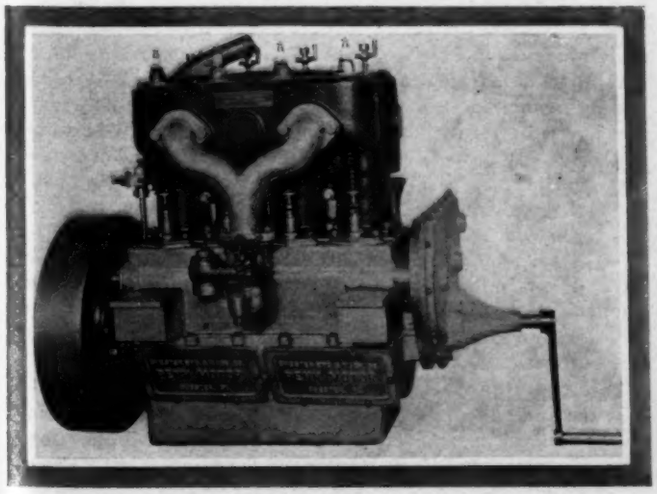
Cooling is by centrifugal pump, although the proportioning of the water pipes was done with the idea in view of utilizing thermo-siphon cooling when so desired. The pump is located on the right-hand side, together with the magneto. The latter is supplied as regular equipment. Lubrication is by the constant level splash system, the level being adjustable by means of a handy screw. This allows the driver of the car to regulate the amount of oil used, a feature not present in other engines.

One feature not observable in the pictures shown, is the starting crank arrangement. This is such that the cranking handle is always held in one position, at the left. When desired to crank the engine over, it is simply pushed into engagement. When the cranking is concluded, the crank may be allowed to swing, as it will automatically check itself, and catch at the left in the usual position. This is a far superior arrangement to a strap, which necessitates loosening and removal for use, and loosening and replacement after use.

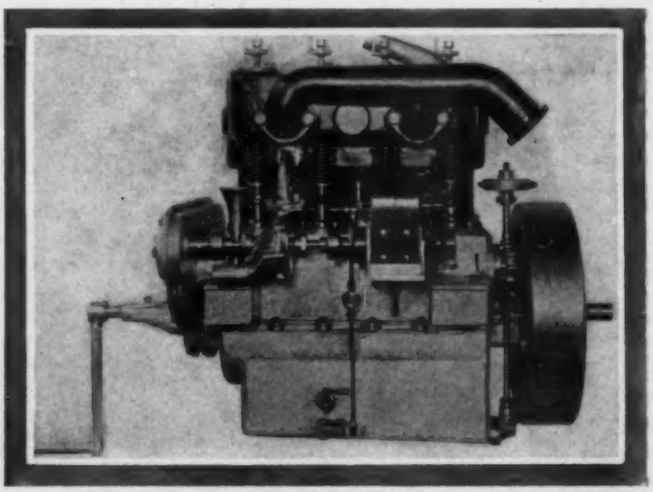
A larger motor is also built along very similar lines, in fact, to the same design. The size of this prime mover, rated at 30 horsepower, is 4 1-4 in. bore by 4 3-4 in. stroke. This is comparatively shorter than the small engine, but still long enough to bring it into the long stroke class. This motor, too, is of the block type, with tee-head cylinders and 3 crankshaft bearings.



Magneto Is Conveniently Located on the Exhaust Side



Inlet Side of Penn Motor, Showing Carbureter and Pipe



View from Beneath, Lower Half of Crankcase Removed

ANOTHER CHAPTER OF GOSSIP FROM DETROIT

DETROIT, Feb. 7—Further evidence of the prosperity being enjoyed by automobile interests is furnished by the increase in capital stock from $1,800,000 to $2,500,000 just announced by Morgan & Wright Company, manufacturers of tires and rubber goods. The firm established its plant in Detroit in 1906, and J. C. Butler, president, declares the demand for automobile tires, principally in Detroit, is responsible for the increase in capitalization, all of which has been paid in cash.

In this connection figures compiled by the official statistician of the Detroit Board of Commerce furnish a striking object lesson in the growth of the automobile business locally, and what it means to the hub of the industry. During the year just closed there was an increase in capital in the various corporations, including new ones to enter the field, from $5,700,000 to $15,200,000. During the same period there was an increase of employees from 8,430 to 14,900. During the year 45,500 cars were built in local plants, with a valuation of $54,300,000, compared with a total valuation of $23,600,000 in 1908.

The Dominion Motors Company, Ltd., has been organized, and will establish a plant in Windsor, just across the border on the Canadian side. Detroit and Canadian capital is financing the enterprise, and experienced automobile men from this city will be in charge of affairs. Operations will be commenced at once, and it is hoped to build 250 cars the first year, the machine being known as the Royal Windsor. Canada has long been looked upon by American manufacturers as an inviting field. A duty of 35 per cent is imposed on all automobiles taken into the Dominion from the United States.

Van Dyke Motor Car Company, Frank G. Van Dyke, president, is out with a delivery wagon with a capacity rating of 1,000 pounds. The plant, which will be located at Detroit, is to be a large one. The area is to be 130,320 square feet and the main building will be 704 feet long. A delivery wagon, the first one out of this make, created quite a lot of healthy excitement at the Detroit show, and reports have it that the demand for this wagon is pronounced. The motor is double-opposed, 4 3-8-inch bore and 4-inch stroke; magneto ignition, and the control will include a friction drive. Geo. P. Davis, consulting engineer of the company, is the designer. In the handling of the company business a service station system will be maintained—service will be guaranteed.

The Lozier Motor Company of Michigan, is now in control of the holdings of the Lozier Motor Company of New York, this action having been taken at Plattsburg, N. Y., last week. The transfer was made on the basis of $493,710 in cash or $822,850 in fully paid non-assessable captial stock at par in the Michigan corporation, in addition to which Henry A. Lozier and Edwin R. Lozier are to get $160,000 in cash or $200,000 in the non-assessable capital stock at par, the duly authorized officers of the Lozier Motor Company, of New York, also to receive $106,290 in cash or $177,150 in stock. It is announced that work on the Detroit plant will be begun as soon as possible.

The Chalmers-Detroit car has now passed into the realm of history. Henceforth that popular car is to be known as plain "Chalmers." This step is officially announced by the Chalmers Motor Company, the reason being assigned that it is desirable in order to avoid confusion with the great number of new cars which have incorporated "Detroit" into their names.

There is another class of scouts of whom little is heard, but who are a recognized part of almost every factory force. These are the men on the lookout for skilled mechanics, for whom there is the keenest demand. They keep in touch with the avenues through which machinists, toolmakers, in fact all kinds of skilled labor, find their way to Detroit, and offer inducements to have the men enter their plant.

The newly organized Owen Motor Car Company has purchased a three-story brick factory building on North Grand Boulevard, adjoining the Packard plant, together with six acres of land. The company is capitalized at $500,000, with $250,000 paid in. It is proposed to build 500 cars the first year, and in the spring work will be begun on a reinforced concrete factory that will increase the capacity to 1,000 cars per year.

Local auto makers are rejoicing over the action of transcontinental lines in rescinding the recent raise in rates on automobiles for Pacific Coast points from $3 to $4 per 100 pounds. On every car sent to the coast this meant the imposition of a tidy sum which either had to be met by the manufacturer or tacked on the selling price by the dealer.

The United States Auto Top Company has been incorporated, with a capital stock of $20,000. The incorporators are W. A. Paul, F. A. Hood and L. S. Anderson.

Grant Brothers' Foundry Company is another new industry, the promoters of which are Charles A., George D. and W. W. Grant, of the Grant Brothers' Auto Company, and Vital Ouellette.

F. H. Trego, secretary of the Chicago Motor Club, and a well-known automobile expert, has joined the ranks of the Hudson Motor Car Company and will be associated with Vice-President and Chief Engineer Howard E. Coffin.

MINNEAPOLIS SHOW WILL OPEN FEBRUARY 19

MINNEAPOLIS, MINN., Feb. 7—Indications are that the third annual automobile show to be given under the auspices of the Minneapolis Auto Show Association, February 19 to 26, inclusive, will be the biggest event ever held west of Chicago.

Notwithstanding there are close on to 25,000 square feet of space available in the National Guard Armory, where the show is to be held, those interested in these annual motor exhibitions are afraid that there will be a shortage of room, and plans are already being discussed looking to the securing of larger quarters for the show in 1911. Already the list of exhibitors for this show exceeds that of 1909 by at least 80 per cent. The space on the main floor of the big armory has all been taken up and on this floor alone upward of 70 bonafide automobile dealers will show. It is estimated that one hundred makes will be exhibited.

There is besides this floor, a spacious basement, which will be used for the exhibition of the heavier class of motor vehicles, such as motor trucks, delivery cars, etc. The space here, too, is being taken up rapidly, and a complete assemblage is promised.

When it is known that there are upward of 50,000 cars now running within the territory of which Minneapolis is the gateway it can be realized how important this show will be to the motor industry of the Northwest. Dealers, buyers and everybody interested in motor cars in the States of Minnesota, North and South Dakota, Montana, Western Canada, Iowa and parts of Wisconsin will be at this show. About 45,000 persons saw the show in 1909, but the present indication is that twice that number will pass through the gates during the week of the show.

Following so closely as it does the Chicago show a large number of automobile dealers who will have exhibits at the Windy City event will ship their exhibits direct to Minneapolis.

The officers of the Minneapolis Auto Show Association, who have the affair in charge, are: H. E. Pence, of the Pence Auto Company, president; H. E. Wilcox, of the Wilcox Motor Company, vice-president; F. E. Murphy, of the Minneapolis *Tribune*, secretary, and Walter R. Wilmot, manager.

MITCHELL HEAD REPORTS PROSPERITY ABROAD

BACK from an automobiling trip in Europe that was productive of much valuable information as well as brimful of pleasant experiences, Captain William Mitchell Lewis, president and general manager of the Mitchell Motor Car Company of Racine, Wis., and G. Vernon Rogers, its secretary, traversed a little more than 2,000 miles of diversified roads ranging from the broad highways of England to the mountain roads of the Pyrenees and the mediocre roads of Spain in the Mitchell six-cylinder machine at the wheel of which sat René Petard, European representative of the Mitchell company.

"We toured from London to Folkestone," said Captain Lewis, "thence from Calais to Paris, and over the Pyrenees to Barcelona, Spain, and back to the French capital, with no motor or mechanical troubles, considerable comfort, and much enlightenment. The American-made cars are enjoying a wonderful amount of popularity in continental Europe and in the British Isles. I am pleased to state, also, that the Mitchell car, one of the pioneers in tthe American invasion, not only is having a big share of this but is in the lead of all others.

"While in London we closed a contract with Lavey Brothers, 20 Conduit street, for a period of five years, the British concern agreeing to take $500,000 worth of our cars. While in London we visited the Olympia show, the largest and best automobile exposition ever held. The success of this show has taught the continental makers, especially the French and German manufacturers, their great mistake is not holding the usual big annual expositions that have served to direct the attention of the world to their wares. As a result of the lesson given to them, the French makers are even now planning for a huge Paris salon in November or December, 1910, to offset the depressing effect of the failure to hold the Salon this year. Germany also is figuring on a great show revival, while the French makers who now realize the lack of wisdom in abolishing great track and road-race classics, are planning a race revival upon one of their big schemes.

"I was impressed by economic problems presented by the European situation. The continent has not the motor purchasing public that the United States has, although in France the national records show that the wealth per capita is more evenly distributed than in any other country abroad. In England there are many poor and also many rich. But the great class that might be depended upon to absorb motor cars is that element which the Britons refer to as 'in trade.' The tradesmen are perfectly able to purchase cars, but they refrain from doing so rather than have it appear they are aping the royalty and aristocracy. The contrast in America is rather marked to the traveler—imagine the business man of the United States going without an automobile if he wished one—and he has the money to buy the car.

"You are struck abroad and especially in London by the number of taxicabs and commercial vehicles. The field is a great one. Before I left there Gamage Limited of London were just negotiating a contract for putting 3,000 more taxicabs on the streets of Greater London, which has 3,000,000 more population than Greater New York and not nearly as many motor cars—and so important has the taxicab problem become that they are starting schools for the education of cabmen's children for the avocation of the chauffeur. The horse-drawn vehicle is rapidly becoming a thing of the past in London.

"While in Spain we closed with Rossello y Mas, 20 Plaza de Tetua, for 25 Mitchell cars. The Spanish automobile agent has a beautiful country estate near Barcelona to which we motored. Near it is a church built in 625 A. D. containing the sarcophagus of a daughter of a former king of Spain."

AUTOMOBILES IN ENGLAND ON INCREASE

From a statement recently issued, based upon official statistics, the following table, showing the number of motor vehicles of all kinds, including public service and motor cycles, in use in the United Kingdom on September 30, 1908 and 1909, has been prepared:

	Total of all kinds.	
In use in	1908.	1909.
England and Wales	137,323	162,181
Scotland	10,907	13,093
Ireland	6,185	7,499
Total	154,415	183,773

	Private motors.	Trade motors.
In use in	1909.	1909.
England and Wales	74,748	13,961
Scotland	6,157	1,066
Ireland	3,933	164
Total	84,840	15,181

The foregoing shows an increase of 29,358 in the total number of vehicles during the last year, which was largely due to the more extended sales in England and Wales. The increase in private cars was 18.8 per cent. According to the statistics, the number of public service cars increased 48.8 per cent. and motor cycles 15.3 per cent., the number of the latter being given as 75,000. These results indicate an increasing demand for motor vehicles, and especially for cabs for public service and cars used for commercial purposes. It is confidently predicted by many that in a few years the number of business vehicles will exceed those used for pleasure.

As to private cars, there was an increase of about 13,435 during the year. Present indications are that cars of small and medium power will predominate during the coming season. Modern improvements in motor cycles, to prevent vibration and noise, will assist this branch of the trade, and it is believed that the coming year will witness an increase of 25,000.

OWNERS' GASOLINE STORAGE PROBLEM

Automobile owners have been handicapped in many ways, but it is doubtful if they have ever been confronted with a more perplexing problem than the safe storing of gasoline. This phase of the automobile business has caused many people sleepless nights of worry. They were continually harassed by the fear that the city fire regulations were not being lived up to. Explosions were feared and dreaded, and an innovation which would sweep all this away was hailed with delight.

Such an innovation received its inception in Pittsburg, where the city officials, constantly on the lookout for infringements of its strict fire regulations, endorsed the project as the best that has been put on the market. That the air-tight steel gasoline tank is not liable to an explosion was demonstrated after the careful inspection made by the city experts.

No city can boast of more strict fire regulations than Pittsburg. The peculiar formation of the downtown section, so closely built up, caused these severe restrictions, and it was with careful regard for these laws that the air-tight tank was finally picked as the safest. Three departments were supplied with them, the Departments of Public Safety, Public Works and Health.

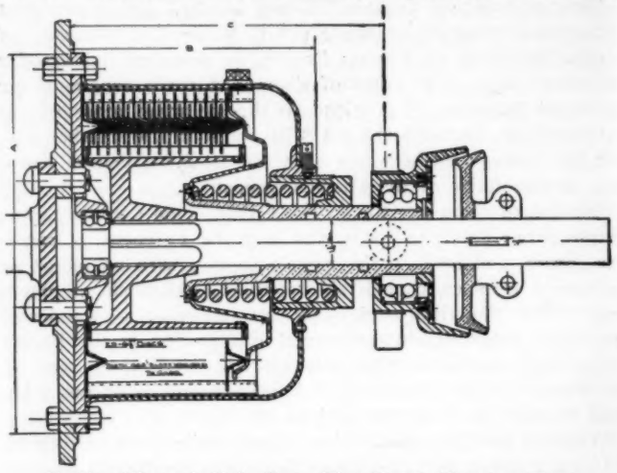
It is recognized among automobile owners and other users of gasoline that this necessary adjunct to the operation of the machine is highly explosive. Its storage was the problem with which auto owners grappled for so long. But with the coming of the air-tight tank, the problem has become no problem at all.

Pittsburg's strict fire regulations were taken into consideration when the air-tight tank was first broached as a possible purchase by the city departments. Its merits were thoroughly looked into before the city ventured to put the seal of approval on them by purchasing them. It was deemed safe to put two of the tanks within the fire limits, while the third was placed at the Department of Health stables in Frankstown avenue, East End.

HELE-SHAW CLUTCH HAS NOVEL M. D. FEATURES

MULTIPLE disc clutches are now so thoroughly well known for their varied and excellent qualities in connection with automobiles, that the improvements which are being made from time to time are interesting in the extreme. The Hele-Shaw clutch, of which a cross section is here given, represents one of the types in the multiple disc family, which has sustained its reputation, and is being taken up by car builders of exacting ideas. As the section clearly indicates, the discs are considerable in number, they being utilized in proportion to the power which must be transmitted, and the outer discs are the driving members, they being fitted to inwardly projecting driving faces, which are integral with the housing, which, in turn, is flanged to the flywheel. The driven discs are on a drum with outwardly projecting driving faces, and the spider of the drum ends in a suitable hub, which is broached with a square hole, which in turn engages the squared end of the driven shaft. The driven shaft is surrounded by a sliding sleeve, and the clutch spring is concentric with the sleeve. A drag brake is shown to the rear of the clutch proper, and when its conical faces are engaged, the slight amount of inertia which might be felt when the clutch is relieved, is overcome by the drag of this supplementary clutch. This is a detail which is well worth looking after.

The Merchant & Evans Company, with headquarters in Philadelphia, Pa., in addition to meeting with good success in the exploitation of the Hele-Shaw clutch, is handling a line of front and rear axles, transmissions, and other specialties, all of which

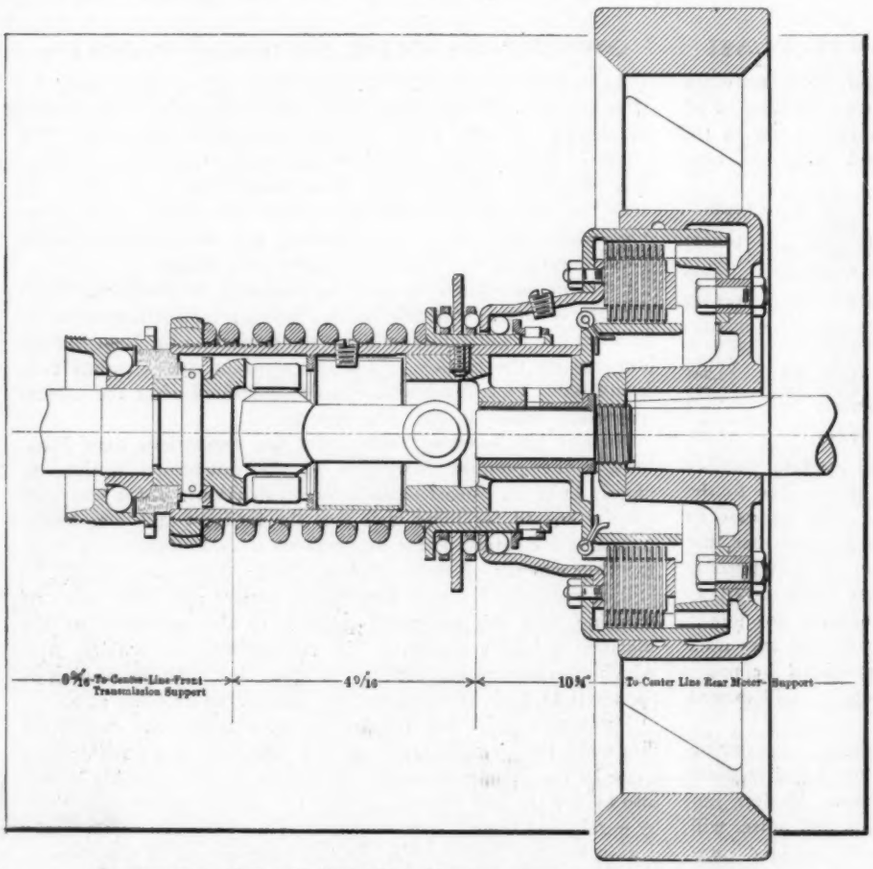


Section Through Hele-Shaw Disc Clutch Showing Discs

are now much in vogue and well known to builders of automobiles of the class which provides a residence for quality.

REO MULTIPLE DISC CLUTCH AND JOINTS

DESCRIBING a whole automobile offers the disadvantage of saying so much that memory fails to grasp the situation from the point of view of details. In the long run it is the detail which will be found at the seat of trouble, and for the best result it is more profitable to discuss details one at a time to bring out the gist of the story. The subject here taken is the clutch and universal joint in the Reo 4-cylinder automobile for 1910, and attention is called to the presence of the universal joint inside of the shell around which the spring is placed. The shell connects with the crankshaft through the discs, but the transfer of power is through the universal joint, which, instead of being placed back of the clutch unit, as it is in many makes of automobiles, is housed in, away from accumulations of foreign matter, and lubrication is easy of accomplishment.



Construction of Reo Multiple Disc Clutch as Revealed in Cross Section

Among the other features which will be found in this unit are: The large size of the spring used to apply clutch pressure; ball thrust bearings to take the reaction of the large spring; pipe plugs which may be unscrewed if it is desired to add to the supply of grease within the housing, and such other features as will add to the good qualities of the unit. The flywheel is placed on the crankshaft by being fetched up on a taper, and a key is there to resist the torsional effort. In assembling, the pin back of the universal joint is readily removed, and the bolts which hold the clutch housing to the flywheel will also facilitate the operation. In divers other respects the assembly as here depicted has novelty in its makeup, and stability besides.